Extended Project Qualification
Candidate Exemplar Work:

- Sample Two/Cohort 3 Standardising
  ‘Why has MRSA proved so difficult to combat?’
INTRODUCTION

The exemplar material compiled for standardising purposes for Cohort 3 is compiled from work submitted and assessed in Cohort 2.

The samples each provide a ‘Production Log’ and a ‘Project Product’ with some accompanying confirmation that a ‘Presentation’ was completed. i.e. the three basic requirements are fulfilled. All the samples reflect (some) work at Level 3.

The sample material is genuine student work that has been edited solely to remove readily identifying information.

The marking exercise in any standardising exercise is artificial – in some ways harder than marking the work of one’s own students where interpretation of evidence is taking place in context. In some instances evidence from the students’ supervisors has been removed for clarity/anonymity or to encourage discussion at standardising.

It is important that in marking these samples you are not overly reliant simply on the explicit evidence in the material supplied. Your assumption should be that the students had excellent supervision (from someone like you!) so that decisions were made based on appropriate choices and if some element of the process is implicit in the final product it should be rewarded on the assumption that the supervisor would also do this having made a note accordingly.

There is a clear emphasis in AQA’s Extended Project Qualification on the realisation of an authentic product developed using skills appropriate to the project. This must be rewarded despite any lack of explicit recording in the log. We do not want the Production Log to become the main element of assessment — it’s completion requires a specific set of skills that are valuable but may not relate well to those required by the project. This award is for the development and realisation of a project not an award for the production of a log with a project attached. If realisation of the project must implicitly have involved certain achievements they should be credited. We will be looking to supervisors to note and record such achievement.

<table>
<thead>
<tr>
<th>Criteria for the award of marks</th>
<th>Max mark</th>
<th>Mark awarded</th>
</tr>
</thead>
<tbody>
<tr>
<td>(AO1) Manage</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>(AO2) Use Resources/ Research</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>(AO3) Develop and Realise</td>
<td>20</td>
<td></td>
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<tr>
<td>(AO4) Review</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td></td>
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</tbody>
</table>
Concluding Comments

Assessment Objective 1, Manage – R…… wished to undertake a project which related well to her current A levels and her ambition to study medicine at University. Her decision to address the issue of MRSA – an interesting and ongoing area of consternation for the National Health Service – was arrived at relatively early in the process and was a good one. Her emphasis changed from ‘progress’ in combating the problem in favour of an analysis of the reasons why the issues has proved to be so persistent. This shift is well documented and explained in R……’s production log. Her ability to plan her research; to present her findings, in terms of incorporating the various changes in emphasis and especially her management of time, were most impressive.

Assessment Objective 2, Use Resources – In many respects this aspect was the one which R…… found most instructive. She obtained information from a wide variety of sources – books, the internet, medical journals, interviews with practitioners (both in the UK and abroad) and the Media (She consciously changed her project to incorporate breaking news stories – indeed her presentation made reference to government statistics which appeared in the press for the first time the previous day!) These laudable features are outlined in R……’s production log and can be witnessed by her bibliography and footnotes. The research process proved particularly insightful because at various stages R…… simply had too much information to include in her project: this necessitated careful editing. This meant that R…… had to make skilful and informed decisions in order to make her findings presentable – in terms of both simplifying complex scientific aspects and making relevant links between the different areas covered in the project. The overall success of this process is evidenced clearly in the project itself but was also seen in the concise content of the presentation. After completing the project, R…… should certainly be well placed to approach the demand of independent research at undergraduate level with confidence.

Assessment Objective 3, Develop and Realise – R……’s final project is a super piece of work. It is focused and well written. Perhaps its best feature is the way in which it allows the reader to gain access to a complex range of scientific and medical problems by presenting them in a manner that is interesting while using language that is easily understood. R……’s IT skills are clearly developed and this helped her manage a challenging editing process and skill and judgement as she was obliged to omit a lot of research material in order to approach the requisite word limit – her decisions, as witnessed by the content and direction of the final essay, were well thought through and merited. Overall, her written conclusions were convincing and she was able to completely outline her findings in her oral presentation.

Assessment Objective 4, Review – R……’s production log provides much evidence of her ability to reflect critically on her approach to learning. She found some aspects, e.g., those associated with the editing process and elements of the structuring/organising of the final piece, a little demanding, but clearly she had developed confidence from her ability to manage these issues. R……’s presentation demonstrated well her understanding of a complex topic and her ability to get across the essential elements to an audience. As she outlines in her log, R…… was a little nervous during her presentation and sometimes relied a bit too much on the content of the slides – she was, however, more confident when responding to questions when her interest and enthusiasm was evident.

Conclusion – R…… has worked very hard to produce a quality project which shows her genuine interest in pursuing a career in medicine. The skills she has learned should be invaluable when she goes to University.
# Level 3 Extended Project Production Log

Candidate name: ..............................................  
Candidate number: ..........................................

Extended Project Working Title: **What progress has been made by the healthcare system in combating MRSA?**

**Note:** This production log should consist of the following pages. Additional journal material, planning evidence, research evidence, records of meetings with your supervisor, etc. may be added in each section.

<table>
<thead>
<tr>
<th>Record of initial planning meeting</th>
<th>Date completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Proposal Form (already completed)</td>
<td>21/6/07</td>
</tr>
<tr>
<td>Plan at start of project</td>
<td>21/7/07</td>
</tr>
<tr>
<td>Mid-project review</td>
<td>18/9/07</td>
</tr>
<tr>
<td>End-of-project review</td>
<td>28/10/07</td>
</tr>
<tr>
<td>Summary</td>
<td>30/10/07</td>
</tr>
<tr>
<td>Presentation record</td>
<td>31/10/07</td>
</tr>
<tr>
<td>Reflection</td>
<td>3/11/07</td>
</tr>
</tbody>
</table>

Extended Project Final Title: **Why has MRSA proven so difficult to combat?**

Candidate's signature: ..............................................  Date: 5/11/07  
Supervisor's signature: ..............................................  Date: 5/11/07
Record of initial planning meeting(s)
This form records initial meeting(s) with your supervisor to agree your project proposal.

Your first idea for topic/title: I am interested in looking at a problem or condition that endangers humans, with possibilities being related to the nervous system or problems associated with bacteria. I could perhaps look at MRSA or the effect of pesticides. Both these topics tie in with my A-level Biology.

Your first ideas for research and development of your project:
I understand little of what MRSA is or how pesticides effect the human body (or have little knowledge of bacterium or the nervous system) so these are areas I need to research. I will read ahead in module text books to gain more understanding and also find out how much information is available. In the form of books and journals from local libraries - I will research which topic is most easily accessible and will speak to my biology teacher for advice.

Your supervisor's main comments and advice:
My biology teacher agreed both topics would be useful background work and link with my exam modules. I was given advice on which topic would be easiest to research and which would most relate to my A-level work.

My supervisor was enthusiastic at my initial ideas and thought both topics would be easy as well as interesting areas to research. He advised looking at recent and current issues and news, along with suggesting to find out about government views and plans on the topics.

Changes, clarifications or additions you have made as a result of your discussion with your supervisor:
After the discussion with my supervisor, I discovered that MRSA is regularly an issue on the news and there are many current campaigns trying to candor the bacterium. As well as there being a lot of publicity, I also found out that there are government debates and many health department worries. The advice from my teacher allowed me to discover the many ways to find the specific research I need. During a further meeting with my supervisor, I decided I will look at MRSA and I will concentrate on the threat to the public as well as looking at the problems in the healthcare system. I decided my project title to be: "What progress has been made by the healthcare system in combating MRSA?" I will begin to locate books on bacteriaca and recent newspaper articles related to MRSA.

Supervisor's initials: Date:
**Centre Name:**

**Candidate Name:**

**Part A: to be completed by the candidate**

**Title of the Extended Project:**

What progress has been made by the healthcare system in combating MRSA?

(You may present the topic to be researched in the form of a statement/question/hypothesis with clear focus)

- the topic to be researched or activity/task to be carried out and sources to be consulted
  - I intend to look briefly at the emergence of MRSA as a problem before looking critically at a range of strategies employed by health professionals to address problems. Research is likely to centre around the internet, quality newspapers/newspapers, health journals (eg. Lancet) and political investigations.

- the course(s) of study or area(s) of personal interest to which the topic relates
  - The topic is relevant to my current A level studies especially Biology, and as I hope to be a doctor it will be intrinsically useful as well as providing a good insight into research techniques on an area of obvious concern.

- your proposed action
  - I shall try first to understand the nature and extent of the problems before researching directly the practical programmes implemented and their relative success. The latter might involve interviews/questionnaires etc. with medical staff.

Please give details of the courses that you are currently studying:

<table>
<thead>
<tr>
<th>Qualification Type (e.g. GCE AS/A, Applied GCE AS/A, A Level, GCSE, Applied GCSE, VRQ, Modern Apprenticeship, BTEC, etc.)</th>
<th>Subject (e.g. Mathematics, English, Leisure &amp; Tourism, Spanish, ICT, etc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GCE AS/A</td>
<td>Biology</td>
</tr>
<tr>
<td>GCE AS/A</td>
<td>Chemistry</td>
</tr>
<tr>
<td>Edexcel GCE</td>
<td>Mathematics</td>
</tr>
<tr>
<td>Edexcel GCE</td>
<td>Further Mathematics</td>
</tr>
</tbody>
</table>

**Declaration by the candidate**

I certify that I have read and understood the AQA’s Regulations relating to unfair practice as set out in the Notice to Candidates overleaf.

Candidate’s signature: .......................................................... Date: 2/7/07
Part B: to be completed by the supervisor

Please comment below on the validity and feasibility of the proposed project, and on the suitability of the sources. The title chosen can be in the form of a statement/question or hypothesis with a clear focus. Please comment on the proposed project using the criteria given below:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Supervisor's comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the project focus within the content of a particular course of study and/or personal interest?</td>
<td>Yes - reflects a genuine interest, is feasible and is connected to broad interest in science.</td>
</tr>
<tr>
<td>Are the sources and research base suitable?</td>
<td>Probably the work is ok - whilst impact of the focus (KEA) might be potentialised there is a lot of current interest in the topic and principal opportunities could be implemented - but focus for some primary research.</td>
</tr>
<tr>
<td>Is the proposed project feasible within the timescale?</td>
<td>Yes - with committed research over the summer holidays based upon prior feedback and identifying any possible part to complete - these could be done with consultation.</td>
</tr>
<tr>
<td>Is there sufficient scope to produce a project which meets the assessment objectives as detailed in the EP specification?</td>
<td>Yes - manageable and research aspects could have potential to enable an original piece of work.</td>
</tr>
</tbody>
</table>

For the purposes of moderation, it is important that we know the format of the project which will be submitted by this candidate. Please tick as appropriate:

<table>
<thead>
<tr>
<th>Format of Project</th>
<th>Please tick</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written report</td>
<td>✓</td>
</tr>
<tr>
<td>Live performance (e.g. in music, drama &amp; theatre studies)</td>
<td></td>
</tr>
<tr>
<td>Electronic format (e.g. CD, video, PowerPoint presentation)</td>
<td></td>
</tr>
<tr>
<td>Artefact (e.g. in design &amp; technology, art &amp; design)</td>
<td></td>
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</table>

Supervisor’s name (please print): ........................................................ Date: 27/07/07

Supervisor’s signature: ..............................................................................

Part C: to be completed by the Project Adviser

Adviser’s comments:

An issue of major current interest that will bear a detailed analysis of both the science and its practical implementation in ‘real’ circumstances.

Approved ✓  Approved subject to the implementation of the adviser’s recommendations  Resubmission required  

Adviser’s name (please print): ..............................................................

Adviser’s signature: ..............................................................................

Notice to candidates

You must not take part in any unfair practice in the preparation of project work required for assessment and you must understand that to present material copied directly from books or other sources without acknowledgement will be regarded as deliberate deception. If you use or attempt to use any unfair practice you will be reported to AQA. If AQA is satisfied that you have committed an offence you may be disqualified from all subjects.

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Dr Michael Crosswell Director General.

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Plan at start of project

This form records your outline plan at the start of your work.

Outline the next steps in your planned research/initial development:

Having decided on my project title I have produced a research plan - I have identified a useful and logical order for obtaining the information I need. I have decided where I will look for research (libraries, newspapers, periodicals, internet, health journals, and have decided to interview people directly involved). I have made an initial structure for the plan of my project and listed the many areas I want to research. I will produce a synopsis and write out briefly a summary of the expected direction the project will go in.

As the examiners report was positive and enthusiastic I am not going to change my initial ideas and plan.

Your supervisor's main comments and advice:

As the response from the examiner mentioned the 'science' element and the "implementation in real circumstances" my supervisor suggested a whole section based on scientific theory and also case studies of 'real' situations. As well as this, I was advised to focus on major current issues and publicity. We also discussed new and different ways to research, as well as looking briefly at the intended plan/structure.

Changes, clarifications or additions you have made as a result of your discussion with your supervisor and/or the comments from AQA

Adviser: I have researched in detail the scientific theory around bacteria and superbugs, and identified sections I wish to research and develop further. Having identified suitable reading material, I have highlighted the areas I have least knowledge and need most research. I have also decided I will compare different hospitals within the UK as well as studying the differences in UK policies and foreign policies. I hope this will give conclusions that explain why the problem has become so bad. I have also established how I will gain first-hand evidence and opinions. As well as this, I have split the whole project into several titles/sections so I can research specific details that relate to relevant topics.

Supervisor's initials: 

[Redacted]
**Mid-project review**

This form records your outline plan about half-way through your work.

Outline the successes, failures, additions and/or changes you made as you followed your Plan at start of project. My initial goal was to study the progress made by the NMS in trying to stop MRSA, but through my research I discovered that little progress has been made and the situation has actually been getting worse. I also realised the areas I had highlighted in research were too vague as there is so much information available and I ended up with far too much material. I found that there were some areas I had not considered in my plan so I had to make some additions. My successful interviews with a G.P, nurse, doctors’ surgery practice manager, the infection control manager at two local hospitals and with a bowel surgeon at Wigan Hospital who is in charge of wound 

Having successfully gathered more than enough research from many areas the main steps are: to cut down my research and decide on relevant information and to change the structure of my project. I need to decide a new title so there has been no progress and establish a new goal. I need to divide my research into specific categories, and with my new structure, rewrite the project and relevant information.

Your supervisor’s main comments and advice at this stage:

My supervisor was impressed with the amount of detailed research but advised me how to select what is relevant. We discussed different project titles and areas to focus on, as well as different ways I could structure the project. My supervisor read my work and highlighted the relevant information. Having discussed a new approach I was advised to establish a new running order.

Changes, clarifications or additions you have made as a result of your discussion with your supervisor at this stage: Having viewed my research from different angles and perspectives, I decided to focus on and changed the title to: “Why has MRSA proved so difficult to combat?” This allowed me to focus my research into relevant sections so I could answer the above question. I choose to divide each topic into a specific category on the scientific reasons why MRSA has been such an immense problem, as well as sections on the “failures of past programmes” and the “solution for the future.” The sections will not be easy to write up as there is a lot of information that needs editing. I will need to remain focused on the question and avoid being tempted to move away from the task set by the question.

The way I have chosen to divide up my research should allow me to produce include the majority of my research but allow me to produce a relevant, manageable checklist. I have cut out large sections of information, mainly irrelevant cases and over-detailed scientific knowledge.
End-of-project review
This form records the (near) completion of your product.

Outline the successes, failures, additions and/or changes you made as you followed the plan in your Mid-project review:

I have successfully presented the relevant information in the correct parameters, although I did have to change the title established in my mid-project review, so as to suit the details I included. I also had to alter the running order to make the sections flow into each other and so I could represent my research in a logical order. I also had to make sure my writing related to the question as I kept moving away from the task. Overall, the writing up of the final draft was rather difficult - not only was it hard to select just the correct amount of information for each section, but it was a challenge keeping under the word limit. I often had to re-visit sections and make further alterations regarding the editing. I am pleased with my time-management skills in that I began my research early enough and had plenty of research to use. My plans did work well, however I struggled updating my work as more news and information became available. As the topic is currently an issue, it is regularly advancing, with news occurring daily. I kept editing my work to include the most recent news. I wish I had set a deadline as to when I would stop collecting research.

Outline any additional advice or comment that you received from your supervisor during this final stage:

The supervisor's advice concerning the writing up of my project, especially his comments on the running order and renaming of sections, was most useful. I was also given advice on editing my work so it was of sufficient length as well as how to decide what to cut out and what is required in my final version - I have made three drafts in total.

Changes, clarifications or additions you made as a result of discussion with your supervisor in this final stage:
The refinement of the final version, with a view that it is easy to read and accessible by a reader with no scientific knowledge, was crucial. I cut out entire sections, while I introduced others, in order to explain the extent of the problem but to make sure any audience can appreciate it. I made sure that I have described the scientific problems in enough, yet simple, detail. As I progressed to my final version, I edited my work so that it is short and brief, yet has enough information but without it being long-winded and boring to read.

Supervisor's initialed site: [Supervisor's initials]

My editing was highly important, not only in maintaining that I stayed within the word limit, but making sure the sections followed on. I also made efforts to remain focused on the question so my final version had only relevant details, unlike in my earlier drafts.
Summary
This form records the nature of your product

Outline (50 – 150 words) the nature of your final product, its main content and its conclusion:

My final version of the project is an analytical study of the main factors why it has proven so difficult to control and combat MRSA. Case studies represent the disastrous effects of the superbug, while the scientific theory of bacteria and evolution explain that the emergence of MRSA is, it seems, irreversible. Having looked at past failures of efforts by the government and the many campaigns, the study describes and debates what hopes there are that one day the superbug will be eliminated. While there are many current projects, ongoing experiments and research are looking at different strategies that could possibly wipe out MRSA. However, many experts believe that the bacterium will always be one step ahead of us and there are too many associated problems to overcome. Now that MRSA is so advanced into the healthcare system, the NHS may never be able to rid hospitals of the life-threatening superbug. It is a case of waiting and watching what happens in the future, whether MRSA is combated once and for all.
Any audience can appreciate it, I will practice the presentation in front of friends in order to perfect the delivery and to familiarise myself with the content.

Presentation record
This form records your presentation and its preparation

Outline the nature of your presentation (e.g. timing, audience, use of visual aids, slides, notes used, etc.)

My presentation will take place on Friday 2nd November, lasting approximately fifteen minutes with a small audience of students and my supervisor. I shall rely mainly on an oral presentation as I describe my findings, but will incorporate a power point which will include photographs, diagrams, important quotes and recent newspaper headlines. I will have a personal copy of what’s on each slide and accompanying notes of the main points I want to state. I will encourage questions at the end, so I don’t lose my flow and my train of thought won’t interrupted. I will answer all questions as best I can. I aim to display my presentation and use certain terminology so that the

Briefly list the main content of your presentation:

I will create a power point and include a range of features and the following sections:

- Explanation of what MRSA is
- Describe the effects of MRSA
- Explain why there is such a problem:
  1. Scientific facts
  2. Failures of past programmes
- Future research plans
- Future government plans
- Conclusion

Followed by questions.

I will include facts on all slides and will also state where I found the majority of research.

[Supervisor’s signature:]

AQA

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MRSA Presentation.ppt

The Presentation on MRSA is not reproduced here for copyright reasons. The Presentation record is detailed on the previous page. It included:

- an explanation of what MRSA is
- The effects of MRSA
- An explanation of why there is such a problem
- Future plans to tackle MRSA
If I feel my presentation went well and I included lots of information without it being too complicated, yet I would like to have been more consistent and made more eye contact with the audience.

Reflection

This form is to record your own evaluation when you have completed your project and given your presentation.

Briefly summarise your main learning from completing this project. You might include new knowledge or expertise that you enjoy or find valuable, a consideration of your planning and organisation, changes you would make if you undertake such work again, advice you would give to others undertaking such a project.

I felt a huge sense of achievement in completing my project, especially as my presentation allowed me to summarise and show off everything I have learnt. Undertaking the project has been an extremely valuable learning experience, from becoming more familiar with the basics of researching to confirming my fascination with health-related issues I have learnt about topics far beyond areas I am studying at A-level, which increased my enthusiasm to study medicine at university. My determination to be a doctor has been strengthened due to my indepth research on the NHS and the interest I feel by academic debates. I now understand the importance of time efficiency and being to locate and identify only necessary sources when undertaking such a detailed study. The drafting and editing of written work is a time-consuming and complex, with the need to remain focused and to write concisely as possible throughout. I feel I have gained many insights and improved my English skills from completing the project, and suspect I have gained advantages if I go on to use problem-based learning at university. I may have to produce smaller, but similar, projects on health problems, making logical plans, remaining unbiased, making notes in a concise manner and researching broad ranges of information on areas I will use and develop in the near future.

If I were to do the project again I would study a similar topic as there is so much information available and new issues are appearing all the time, as well as the fact I found the area so interesting—health is one of the most important factors in a person’s lifetime and I wish to study this further. However, I would set a cut off date when collecting new information and I would also try to actually visit and inspect a hospital and the conditions. When offering advice, I would emphasise the need to start early, gather enough material to write a detailed project, make thorough and concise plans as well as using a wide range of methods to collect information. I would also suggest researching a topic with current interest as this creates more debates and interest. I would also suggest planning the presentation well and to be consistent.
Why has MRSA proved so difficult to combat?

The Extent of the Problem

MRSA (Methicillin-Resistant Staphylococcus Aureus) is a superbug (a bacterium that has become resistant to many specific antibiotics) and it is one of the British government’s current top priorities to reduce the infection rates; which are the highest in Europe. Over the past few years the NHS (National Health Service) has been given immense financial support by the government, which is currently costing an extra £150 million per year, yet the problem has still escalated, with 2000 deaths in the UK every year. National speculation and extreme recent publicity shows that the government and Health Department are obviously worried, with experts questioning why, after £1 billion is spent on MRSA patients per year, only ten NHS trusts can demonstrate they isolate and treat efficiently more then 90% of MRSA patients. Each year 300,000 patients pick up a hospital infection (almost 10% of all patients in UK hospitals) with 5000 dying; and it is thought a staggering 30% could be avoided simply by the application of basic good hygiene practices.

Recent experiments at Rockefeller University in the USA have shown, by studying blood from a patient, how easily the MRSA bacteria adapts making it so difficult to combat. In ninety days the bacteria mutated thirty-five times to avoid an antibiotic, and the patient not only became fully resistant to the drug, but also acquired resistance to a drug they were not even exposed to.

Broadly, scientific, as well as practical, factors have prevented MRSA from being wiped out and raise the question whether there is any hope at all of combating MRSA in the future.

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1 British Infection Society
2 It also costs between £4000 and £15000 to treat one patient! – The Lancet Medical Journal-May 2005, article 5
3 The Guardian-18th July 2007
4 The Lancet Medical Journal-May 2005, article 5
5 In fact a total of 25% of UK hospitals fail to meet simple hygiene standards -Health protection Association website
6 www.newscientist.com
The problems for patients

MRSA is mainly passed on via touch, through the air, through droplets from the nose/mouth, from dirty clothes and bed-sheets as well as through blood transfusions. The transmission of the bacteria is exceptionally easy while successful treatment methods are a lot more complex as nearly all antibiotics have no effect. The antibiotic that still kills MRSA is “Vancomycin”, but there are now cases emerging that are resistant to even this drug, claimed to be the last line of defence.\(^7\)

Unfortunately there are frequent cases of MRSA “tragedies” and deaths in all UK hospitals which indicate the seriousness of the problem and the devastating effects it has. An article from April 2007\(^8\) represents a typical story where an elderly patient contracted MRSA during a routine hospital stay which cost her life. Irene Brailsford, who was a bladder cancer survivor, attended King’s Mill hospital in Nottinghamshire and picked up a bladder infection which was in fact MRSA. A six week stay in hospital (which should have been three days) to remove a toe abscess resulted in MRSA also being found in her bloodstream. Having no treatment and being given no antibiotics, despite positive tests, she was discharged. Irene had to go back into hospital to have the toe amputated but her foot turned black and she spent the last two months of her life trembling in hot sweats before she died, just days after her eightieth birthday. This all happened because of the bladder infection she picked up months earlier which shows how quickly MRSA can get hold and take effect, but is also evidence that patients are left untreated with the infections being allowed to spread.

Another case study is that of Moya Stevenson\(^9\), who attended Sherwood Forest Trust in 2001 for a routine hernia operation. Less than 24 hours after entering the hospital fit and well, Moya contracted MRSA and ended up with a six-month battle. Although signs and symptoms were evident after one day, it took doctors six weeks to make a diagnosis. Moya experienced dirty rooms; nurses not washing hands between patients; no gloves or aprons; infected patients being bunched together; unsterile environments; and dirty theatre trolleys. Eventually Moya recovered from the infection but was so

\(^7\) themayoclinic.com/diseasesandconditions
\(^8\) The Guardian-23rd May 2006
horrified with the whole experience that she is now the funding and promotions
manager of MRSA Action UK, a registered charity that raises public awareness of
infections and influences government policies. This case study shows how easily
MRSA can spread in dirty environments and how important cleanliness is in the battle
to control the problem.

9 The Independent- 8th April 2007
The Scientific Roots of the Problem

MRSA is a strain of the common bacterium “staphylococcus aureus”, which people come into contact with almost every single day. The bacterium lives harmlessly on around 30% of the population with often only a few minor symptoms. Staphylococcus aureus infections can be treated successfully with antibiotics, but the MRSA strain (which is less common than other strains) is resistant to nearly all antibiotics, hence the descriptor, “Methicillin-Resistant Staphylococcus Aureus”. Not only does this make it exceptionally difficult to treat, the bacterium has the opportunity to spread quickly. Experts have so far discovered seventeen strands of MRSA, each with different levels of immunity to various antibiotics—it is hard to identify between the strands and therefore to address which treatment is necessary.

The bacterium enters our body when the skin is broken, but the MRSA strains are no more aggressive or infectious than other types of staphylococcus aureus—just a lot harder to treat. MRSA can cause lots of different types of infections (making it difficult to identify), though not usually to healthy people. The elderly or people who have open/healing wounds are at greatest risk of becoming infected. Nearly all cases are discovered during a hospital stay, just after a hospital visit or after a surgical procedure, but there are also out of hospital (community acquired) strains. These are even more infectious and their spread is almost unpreventable.

The bacteria are constantly mutating—changing their genetic code (DNA)—so some strains have a genetic make-up that has a slight advantage when it comes to fighting off an antibiotic attack and can become dominant throughout a population. The superbugs “fool” the drug that is attacking them by continually changing their shape and structure. The antibiotic can no longer recognise its target, and are practically useless. The MRSA superbug has mutated so much it has developed into “super-strains” (resistant to most antibiotics), and experts cannot develop a drug that will kill it—however most superbugs can be eventually treated when the correct drugs are found. The main way that superbugs (and MRSA) survive, reproduce and pass on

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10 The Patients association- Making Sense of MRSA
11 Infection Control Nurses Association
their resistance to offspring is by patients regularly not completing antibiotic courses. The bacteria are not destroyed, but they adapt to the drugs, mutate and evolve so as to become resistant to that antibiotic. This ongoing process is one of the obvious reasons why MRSA has not been wiped out. Superbugs are strains that carry two or three resistant genes and so have exceptional powers of resistance, which is why they cannot be easily killed.

The scientific properties of bacteria make it very difficult to combat MRSA no matter what is done. As bacteria are very small (approximately 1/1000mm in length) single-celled organisms they cannot be seen by the human eye and go unnoticed. There are some types of bacteria that are necessary to all life on earth- they break down dead organic matter; help with fermentation\textsuperscript{12}; are involved in the nitrogen cycle; help control pollution and also have an important role in our digestive systems while harmless bacterium in the body also prevent the more dangerous strains from growing, some types of bacteria can be deadly and can cause fatal diseases and infections. One of bacteria’s significant adaptations is that they can live practically anywhere on earth\textsuperscript{13}, but when bacteria cannot survive in an environment they can form an “endospore”- a small, round, thick-walled structure that stores the bacteria’s genetic material (DNA). The endospores are very resistant and can protect the DNA from freezing, overheating and drying out for many years. Once the endospore lands in an environment it can survive in, it will open up and the bacteria can grow and multiply again. This means bacteria can survive through long periods of “hibernation” when the surrounding environment is unfavourable; which makes it impossible for bacteria to be killed and wiped out completely.

Bacteria are also able to function in environments where there is no oxygen-they are anaerobic. Areas in the body such as the intestine, decaying tissue, and wounds that are particularly deep and dirty have low levels of oxygen so bacteria can survive here\textsuperscript{14}. This is why so many MRSA infections appear in deep wounds and where patients are in dirty environments.

\textsuperscript{12} Which involves production of cheese, yoghurt, bread and beer- Phillip Allan Biological Sciences Review, November 2006- page 46
\textsuperscript{13} This includes: in soil, acidic hot springs, radioactive waste, sea water, organic matter, on live animal/human bodies, in plants and deep in the earth’s crust.- www.thenakedscientists.com
\textsuperscript{14} www.physorg.com
There are approximately ten times as many bacterial cells as human cells in the human body, with large numbers of bacteria on the skin and in the digestive tract. The huge amount of bacterium on the skin makes it inevitable that when the skin is broken the bacteria will enter the body. It is impossible to rid the body of all the harmful bacteria, which is why it is so difficult to stop MRSA and other bacteria causing infections in the body.

Staphylococcus aureus is different to other bacteria, but what has made this bacterium so difficult to control? Firstly, staphylococci are in the air, sewage, water, dairy products and on food equipment as well as preparation surfaces, and are found in the nose, throat, on the skin, on hair follicles and down nails of all warm-blooded animals. Staph bacteria grow and reproduce at temperatures from 50 degrees F to 120 degrees F - this shows they can even survive very hot temperatures and it takes extreme heat to kill them. Their most rapid growth occurs near body temperature (about 98 degrees F) which is ideal for the bacteria when reproducing inside the human body, and makes it even more difficult for us to try and stop their growth.

Other factors which make staphylococci impossible to control include the facts that flies transmit it between humans and animals as well as from sewage and food; droplets from the nose carry it; and it can penetrate the skin through hair follicles and ducts of the sweat glands, which allow it to spread to any tissue or organ. Staphylococci can also live in dust and survive on sheets and blankets, which is why hospitals have great trouble controlling it.

Bacteria reproduce at tremendous speeds (as often as once every 15 minutes) by cloning-when a single cell or whole population of cells form from one other cell. Asexual reproduction (involving one parent cell) involves “binary fission” where a cell splits, producing two exact copies and genetically identical daughter cells. As

15 Staphylococcus aureus and other Hospital Bacterium- Phillip McGuinness, 1991
16 Nurses’ Guide to Staphylococcus aureus- 2003
17 Hospital Infection Society website
18 Collins Advanced Sciences text book-1999-page 114
numbers of bacteria are so high and as they clone so quickly, they cannot be controlled and we will never be able to keep up with their ever-growing numbers.

Staphylococci, and other bacteria, do not just clone themselves: they are continuously adapting to the ever-changing environment where only the most suited and best adapted survive. The statement “survival of the fittest” explains how bacteria evolve by changing their DNA (or obtaining completely new DNA) to give them an advantage, like antibiotic resistance, in order to live where only the most adapted survive. As scientists are continuously throwing new and advanced antibiotics at MRSA, they adapt quickly and mutate (where the DNA changes) rapidly so as to outrun the advances in medical science. A mutation that helps MRSA survive antibiotics quickly becomes dominant, so the bacteria cannot be controlled. Weaker strains die out, leaving naturally resistant strains- so if you encounter a staphylococcus bacterium it is most likely to have survived an antibiotic attack and is therefore resistant. As time goes on more and more staph strains will have resistant genes increasing their survival ability, so it is getting harder every day to stop MRSA.

Antibiotics work to kill harmful bacteria that have got past our immune systems by helping to mount a defence. Antibiotics can stop working as the bacteria evolve and adapt. MRSA has become very successful at preventing antibiotics from working, most obviously by using “power pumps” to shoot the drugs back out of the cells, changing its structure so drugs do not recognise it and even producing enzymes that actually destroy the antibiotics. MRSA is very efficient at acquiring new genes that protect it from antibiotics as well as being able to mutate effectively—this is why the superbug survives and is multiplying.

The unnecessary and excessive overuse of antibiotics, in both human and veterinary medicine, is one of the main reasons behind the evolution of superbugs like MRSA. It has become very common for GPs to over-prescribe antibiotics with patients even being given them for viruses (though antibiotics have no effect on viruses); this just

20 The Department of Health website
21 Royal College of Nursing website
strengthens the communities of bacteria. The overuse allows bacteria to come into contact with the drugs more frequently and an increased chance to become resistant. The greater the exposure of the drugs, the more likely bacteria will gain resistance. As MRSA has already come into contact with nearly all antibiotics that have been developed, it is difficult to treat and so is allowed to continue spreading.

MRSA is most common in hospitals and nursing homes as this is where antibiotic use is highest and many strands of bacteria are thrown together, increasing and accelerating the natural selection process of evolution. Therefore, the most powerful drugs are reserved to treat only the most stubborn infections, slowing down the development of resistance.

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22 Department of Health website
23 www.newscientists.com
24 The Royal College of Nursing website
25 The Daily Mail-June 2007
The failures of past programmes and why MRSA is still an issue today.

In the last ten years there have been many intense programmes, strategies and detailed guidelines aimed at combating MRSA, but unfortunately none have made a significant impact and we are now no nearer to combating the superbug. The UK government released national guidelines in 1998 aimed at infection control teams developing policies and procedures to control MRSA. However, wide variations in local management teams along with ineffective control measures hampered the efforts. Experts identified the factors that most increase the risk of infection and they separated units of the hospital into different risk categories. However, due to a lack of access to necessary facilities and as health professionals had poor hand-washing techniques (said to be the single most important activity for reducing the spread) it was concluded that the guidelines had failed. Poor hand-hygiene meant that hospital environments and patients continued to become contaminated. The major implication with the new guidelines was that routine screening of staff and pre-employment screening was made unnecessary; so the spread actually increased between staff; and therefore between patients.

In 2000, the NHS promoted a new campaign: “Saving Lives” aimed to reduce infection rates and deliver cleaner, safer care. The objectives were for all trusts to review infection control policies and improve cleaning services and bed management teams. Patients with the same type of infection were now to be put in the same wards and rooms; however this just made it more difficult to get rid of MRSA and increased patients’ recovery time. Single room nursing was introduced - only designated staff could look after infected patients and these staff should not look after healthy patients. However, this was impractical as wards were often under-staffed or nurses were needed elsewhere.

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26 The Lancet Medical Journal- October 2006, article 7  
27 These were poor hand hygiene, poor cleaning, over-crowding and insufficient isolating of infected patients- source: Health protection Association website  
28 www.themayo Clinic.com  
29 Pulse Medical Journal- August 2007, page 35  
30 The British Medical Journal- July 2005  
31 www . clean - safe - care . nhs . uk  
32 The Practitioner Medical Journal-August 2007, page 58  

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In 2003, “Winning Ways” recommended that all NHS services should have a director of Infection Prevention and Control that would oversee infection policies; who was responsible for a control team; who had authority to challenge inappropriate hygiene practice; and who would recommend changes in policies and produce an annual report on progress\(^{33}\). Although this was a very positive step, there was little change to infection rates.

In 2004, the National Patient Safety Agency launched the “cleanyourhands” campaign aimed at reducing patient risk by improving the national standards of hand-hygiene\(^{34}\). Alcohol hand rubs were placed next to all patient beds so staff could quickly and effectively clean their hands without towels or water. Patients were also invited to be involved in improving hand hygiene - they were encouraged to demand the highest possible standards. As well as this, new patient bedside phones were introduced that included speed dial buttons to alert staff to the need to deal with a hygiene problem. Although the scheme received very positive feedback, MRSA rates have so far not decreased enough for the project to be deemed successful.

Also in 2004, over one million NHS staff received infection control training\(^{35}\). However, this was nowhere near the number of staff that needed the training so the effects were not seen on a national scale. The staff were given a pay rise for the training - yet as this training is essential it was criticised by some observers who felt they should not receive payment and that the money should have been spent more effectively improving facilities.

In 2005, the Royal College of Nursing (RCN) released the “Wipe It Out” campaign, which targeted all healthcare workers and aimed to improve infection control practices; inform and advise the public about stopping the spread; and to influence the government’s adoption of the RCN’s own control methods. However, the RCN concluded that “the next government will need to invest in hundreds of thousands

\(^{33}\) www.patientexperience.nhs.estates.gov.uk
\(^{34}\) www.npsa.nhs.uk/cleanyourhands
\(^{35}\) National Patient Safety Agency
more nurses’ uniforms, require employers to build adequate staff changing and laundry facilities and introduce 24-hour cleaning teams in all acute hospitals if they are to successfully tackle MRSA”\(^{36}\). So, although a lot of work was put into trying to solve the problem, this was not enough, and a terrific amount of work and improvements were still needed.

Later, in 2005, the Chief Nursing Officer demanded more action for cleaner hospitals. Nurses, doctors, consultants and cleaners from 939 hospitals in the UK took part in “Think Clean Day”, raising the profile of good hygiene\(^{37}\). The RCN, as well as the Department of Health, strongly backed the programme with hospitals trying to take immediate steps to improve infection control, but with an objective that it was long-term action that counted\(^{38}\). “Think Clean Road-shows” gave trusts advice and prepared them for the “Think Clean Day”. Promotional packages with a focus on cleaning were given to all staff with a hope that the day would improve hospital-cleaning plans. It was hoped that the input would improve the national standards and change monitoring procedures already in place. It was decided that simple but effective measures would be focused upon, including hand hygiene, more alcohol-based hand gels and the usage of more gloves/aprons. However, the project was criticised because it was argued that every day should be “Think Clean Day” and that hospital staff have a duty to make sure hospitals are always hygienic and safe for the public.

The many campaigns and projects have on the whole been relatively unsuccessful in reducing rates -especially as £68 million has been spent on campaigns by the government\(^{39}\); but there are other factors as to why rates have not reduced. One reason is the lack of clean uniforms for staff and inadequate laundry facilities- less than 47% of hospitals provide a clean uniform for each shift which means they

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\(^{36}\) British Journal of Nursing- August 2007, page 16  
\(^{37}\) www.society.guardian.co.uk  
\(^{38}\) “Doctor” medical journal-August 2007  
\(^{39}\) The Department of Health website
become grossly contaminated\textsuperscript{40}. As well as this, although hospitals are open 24 hours a day, 24-hour cleaning teams are not available, so dirt accumulated at night is not cleaned until morning\textsuperscript{41}-allowing bacteria to spread and infect patients. As unhygienic practice allows MRSA to survive and reproduce, clean hospital environments should be the government's number one priority-obviously this is not the case.

As well as this, the NHS watchdog believes that "nurse's workloads are too high; wards are so understaffed yet so over-crowded with patients, with the working conditions so poor, it is impossible for nurses to meet expectations, targets and the infection control precautions"\textsuperscript{42}. There is simply not enough time and too few staff for all infected patients to be identified and treated successfully- 45\% of trusts claim that "time targets" for treating patients and pressure on available bed spaces, prevent patients from being placed on the correct wards and treated effectively\textsuperscript{43}. It was also stated that a lack of training is to blame for increasing numbers of infected patients.

Due to the pressure for beds\textsuperscript{44} the NHS cannot take the measures that defeated MRSA problems in the Netherlands, where on discovery of the infection the ward is closed and thoroughly decontaminated\textsuperscript{45}. The NHS does not have the capacity to do this, but as well as this screening in half of British hospitals can take three days to complete\textsuperscript{46}. The Netherlands has the lowest MRSA levels in Europe (the UK has the highest!!) and it is believed that their strict attitudes to destroy bacteria on detection, along with their "search and destroy" strategies, are why they have been so successful. It has been advised that introducing similar programmes would rid UK hospitals of the infections\textsuperscript{47}. Another method used in the Netherlands is closed wards

\textsuperscript{40} Also with few changing rooms staff are forced to wear uniforms out of the hospital, acquiring and spreading germs. It has also been discovered that not all uniforms are washed to temperatures high enough to kill the bacteria.
\textsuperscript{41} www.phls.co.uk/infections
\textsuperscript{42} Infection Control Nurses Association website
\textsuperscript{43} Hospital infection Society
\textsuperscript{44} MRSA patients represent a loss of 3.6million beds per year – source: "Doctor-Independent Voice of General Practitioners" medical journal
\textsuperscript{45} Leiden Hospital, Netherlands
\textsuperscript{46} Infection Control Department
\textsuperscript{47} Surgeon, Naomi Watts-Wigan Hospital
and separate rooms for all patients-this immediately halts the spread of infection, unlike the highly contaminated open wards in the UK.

Open visiting is also preventing MRSA being wiped out, with visitors entering and leaving hospital wards at all hours without any kind of protection, screening or decontamination; and therefore helping the bacteria spread.\(^{48}\)

When questioned why hospitals are not given more money to invest in cleaning and hygiene, why more staff are not employed and why specialised facilities are not invested in, the National Audit Office claims\(^{49}\) "it is estimated that infections like MRSA already cost the NHS as much as £1 billion each year and no more can be afforded". Over 36% of trusts admit they have problems combining investment in cleaning with financial targets, while 88% say that limited IT structures and facilities restrict their infection control practices.\(^{50}\) So the problems with staff, training, uniforms, facilities and hygiene all come down to a lack of funding from the government.

As mentioned earlier, the over-prescribing of antibiotics has been proven to increase bacterial resistance to drugs and a recent study\(^ {51}\) has shown that UK doctors are still over-prescribing despite national guidance. The recommended 24 hour delay before doctors file an antibiotic prescription has resulted in a 40% fall, but unpublished data shows that community prescribing is again rising, increasing the chances of bacteria evolving and becoming immune.\(^ {52}\)

There are therefore many reasons why MRSA is still present in UK hospitals, however, due to the fact that MRSA has been in the system for so long and has already progressed so far, as well as being transmitted so easily by touch and through the air, it seems it is impossible for us to wipe it out and combat the bacteria.

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\(^{48}\) The Bolton Evening News-June 2007-page 8
\(^{49}\) The British Medical Journal-April 2007, page 22
\(^{50}\) Royal College of Nursing website
\(^{51}\) Infection Control Nurses Association
\(^{52}\) The Practitioner Medical Journal-August 2007, page 58
completely\textsuperscript{53}. Now that we have allowed it to settle, it has been stated: “another
discovery like that of penicillin is needed to destroy it”\textsuperscript{54}. The bacterium is always
one step ahead and constantly mutating, and we simply cannot keep up, never mind
control it. So, the questions have to be asked: will we ever combat MRSA or should
we learn to live alongside it and cope the best we can?

\textsuperscript{53} www.newscientist.com
\textsuperscript{54} The Guardian- 18\textsuperscript{th} July 2007
Hope for the future

Despite the depressing statistics and evidence that MRSA is still spiralling out of control, there is, fortunately, still some hope for the future with new projects, government plans and on-going experiments that may hopefully reduce rates and, some day in the future, may even combat MRSA. An example of progress in “science based research” is that British scientists are developing an “anti-MRSA virus-laden” nasal cream that is to be put up the noses of doctors, nurses, patients and visitors. The cream will be available in two years and it is believed it will kill the 15 strains that are currently found in hospitals, and will dramatically reduce the spread.

Also, researchers from the University of Florida have discovered an enzyme that produces folic acid and also performs cell division in the staphylococcus aureus bacteria. This is a perfect target for an antibacterial attack and specialists are now finding the best ways to attack this enzyme and therefore stop bacteria’ multiplying.

Further, the latest efforts from another US university, Boston, have raised hopes that they have discovered a way to weaken the bacterium’s genetic defences and to produce more lethal antibiotics so that the emergence of antibiotic-resistant bacteria can be limited. Results from on-going experiments and research are being eagerly awaited to justify this optimism.

As well as this, science based research has proven that the computer analysis of existing drugs can help chemists fight emerging infections and antibiotic-resistant bacteria like MRSA. Developing “emergency” drugs by merging chemistry with computer science, to help save time and money, can identify antibiotic candidates that could hopefully destroy MRSA.

Also, studies in UK hospitals during 2006 showed that dry steam applied at temperatures of 180 C can destroy bacteria, including MRSA, in less than two 

55 The Guardian, August 2007
56 National Research Council, USA- 2007
57 www.physorg.com
seconds without the use of chemicals. Tiny reaction chambers that produce instant steam for use in hospitals to decontaminate infected areas are currently being developed\textsuperscript{59}.

Elsewhere, the University of Bonn are investigating whether the old household remedy, honey, really does treat infected wounds better than antibiotics. They have developed “medihoney” and have received very positive results that it heals wounds effectively in weeks and recently came out on top above modern antibiotics, with German doctors campaigning for it to be used nationally\textsuperscript{60}. The faster wounds heal, the less chance of wounds becoming infected; and it has already been proved with medihoney dead tissue is rejected faster and wounds heal more rapidly. A large-scale study is investigating whether medihoney can be used internationally.

In addition, British scientists at the Institute of Physics\textsuperscript{61} advocate using diamond coatings to form strong chemical barriers on catheters and medical implants to prevent tissue becoming infected, and Birmingham Hospital has begun installing copper surfaces\textsuperscript{62} for an 18 month trial designed to minimise bacterial transfer\textsuperscript{63}. These are just some of the many advanced and complex studies being carried out.

Likewise, a new project has also been introduced at a north London hospital\textsuperscript{64}. A small air-conditioning unit draws air in and ultraviolet bulbs kill the bacteria before the air is blown out. Hopefully this application will eliminate the airborne transition of bacteria and at only £1000, such devices are cheap to purchase. Also, curtains which contain a sliver pigment that kill bacteria within 30 seconds are being distributed by the government to highly infected hospitals\textsuperscript{65}.

\textsuperscript{58} American Chemical Society, published in September 2007
\textsuperscript{59} The Independent-November 4\textsuperscript{th} 2006
\textsuperscript{60} The Health Protection Association
\textsuperscript{61} The Royal College of Nursing website
\textsuperscript{62} Bacteria die in less than 5 hours on copper, unlike on stainless steal where they can live for days
\textsuperscript{63} The Department of Health website
\textsuperscript{64} The Daily Mail-June 2007
\textsuperscript{65} Bolton Evening News- May 2007
Taken together, these projects all bring a lot of hope that eventually scientific methods will be discovered to combat MRSA. Certainly there has recently been a lot of publicity on hospital infections and MRSA which shows that the government and Health Department are obviously worried.

At the recent Labour Party Convention several politicians commented on infection control and MRSA has been quite a serious and common talking point. There have been many reports on the TV news and in newspapers about the proposals and numerous discussions. Consequently, Alan Johnson, the Health Secretary, pledged to concentrate on patient care while announcing there is to be a new health regulator for cleanliness aimed at eliminating MRSA and other superbugs, with the power to close and clean wards before they are reopened\(^6^6\). He explained that the government will have tougher powers to inspect, investigate and intervene when hospitals fail to meet hygiene standards. Personal safety alarms for staff will be issued as part of the £97 million boost to the NHS budget. Likewise, Gordon Brown confirmed plans of a “deep clean” in all hospitals to drive out superbugs around Christmas, as well as the number of hospital matrons doubling with new powers to ensure cleanliness. The deep cleaning of wards every eighteen months was also promised by Brown, as well as all hospitals being returned to their initial state of cleanliness in the next twelve months to rid them of all fatal superbugs\(^6^7\).

As well as this, Alan Johnson stated that a new clothing guideline is to be brought out. Doctors will be provided with short-sleeved tunic uniforms made of antimicrobial fabric to fight infections. As white coats have been banned, doctors must be bare below the elbow to stop infections spreading from their cuffs, and the stethoscope may also be replaced by a more hygienic MP3 recorder\(^6^8\). The government also stated that the “cleanychourhands” campaign will be extended from hospitals to GP surgeries, ambulances, care homes and hospices. Empowering patients and being open with the public are also high on the government’s agenda with patient forums being invited to inspect hospitals four times.

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\(^{66}\) British Infection Society  
\(^{67}\) The Guardian- September 23\(^{rd}\) 2007  
\(^{68}\) The Independent- September 25\(^{th}\) 2007
a year. The health watchdog are also planning spot checks on 120 hospitals over the next year as part of health inspector’s biggest crack down on MRSA yet\textsuperscript{69}.

In 2006, new guidelines were released for the control and prevention of MRSA and they again stated that the unnecessary use of antibiotics should be avoided at all cost as well as the routine screening of patients, as soon as they are admitted. Although it is not always practical, a target for the NHS was to isolate every single infected patient\textsuperscript{70}.

With this objective in mind, the Head of Infection Control at Wigan Hospital explained that all UK hospitals follow the same guidelines and targets, and the objectives for 2007 are that every single trust should review their “screening and decolonisation policies and assess what would be the best and most practical approach for immediate implementation”\textsuperscript{71}.

There are also several conferences planned over the next few months-this represents the seriousness of the problem as well as the efforts being sought to combat MRSA. For example, the Hospital Infection Society has just held a two-day symposium discussing what works and what does not. The hospital Infection Society is also holding a study day in October to look at new research and the Infection Control Nurses Association are having their annual conference in November aiming to advance infection control through education\textsuperscript{72}.

\textsuperscript{69} The Department of Health website- September 2007
\textsuperscript{70} Local enhanced Services booklet, sent out to all GPs and practice managers 2006
\textsuperscript{71} Head of Infection Control, Wigan Hospital- August 2007
\textsuperscript{72} The British Journal of Nursing-July 2007
\textsuperscript{73} Health Protection Association website
\textsuperscript{74} The number of cases has fallen from 7096 to 6378 cases, compared with the year before.
Conclusion

The unfortunate case studies and accompanying publicity identify the catastrophic problem of MRSA. It is evident that with the numbers of cases over the last ten years, MRSA is definitely out of control, and it is one of the government’s main worries today. In the last five years MRSA rates have been steadily increasing\(^{73}\), but fortunately over the whole year from April 2006 to March 2007, cases in the UK have fallen by almost 10\(^{\%}\)\(^{74}\). Experts are unsure whether this drop is due to the new guidelines and strict campaigns currently in place or just another fluctuation in the pattern of cases each year. We will have to wait and see whether the rates continue to decrease, and together with the deep cleans and new uniforms, rates improve again.

The scientific theory explains how and why MRSA has become an epidemic, and also the reasons why it is still out of our reach today with the continuous adaptations of bacteria. Understanding the extent of the problem and the behaviour of bacteria is allowing experts all over the world to make scientific advances and surely it is only a matter of time before a scientist somewhere develops a new antibiotic or technique that could combat MRSA. On the other hand, many scientists believe that the infection has “already gone too far and there is no way back”\(^{75}\). The ever evolving bacteria and the idea that we humans simply cannot keep up with the adaptations of bacteria back up the theories behind this statement. Some experts even believe that bacteria will always be one step ahead\(^{76}\).

While the current practice and hygiene in UK hospitals is dismal, the government and the health department are introducing new guidelines aimed at improving hygiene and infection rates. There are clear messages to the whole medical and health professions that it is crucial that hygiene in all hospitals improves, which hopefully should result in MRSA cases falling. Although campaigns and strategies have failed in the past, there is currently a sense of urgency to try and improve hospitals and reduce contamination rates, especially as the rates of another bacterium acquired infection

\(^{73}\)The Lancet Medical Journal- October 2006, article 7
\(^{74}\)The Guardian- September 23\(^{rd}\) 2007
\(^{75}\)The Guardian- September 23\(^{rd}\) 2007
“C. Difficile are soaring\textsuperscript{77}. While there is no guarantee that the new programmes will
be any different to previous ones, the attitudes and efforts of the government are
definitely stepping in the right direction, and we can only hope and wait for the
results.

More and more money is being pumped into the NHS with vast amounts being put
aside for cleaning hospitals and for new facilities aimed at combating superbugs like
MRSA\textsuperscript{78}. Although there are many new projects and efforts to try and wipe out
MRSA, it is clear why the problem has become so advanced and seemingly
insurmountable. The grand scale of the problem and the fact that the bacterium is so
far in “the system” almost makes it impossible for it to be destroyed. The future, in
respect to combating the superbug, may seem bleak, but there is still hope in the
efforts of scientific experts and with the backing of the government, and there is a
slight possibility one day we may take control of MRSA. However, it does seem
likely that the bacterium is too advanced and no matter what is done, maybe it is
inevitable that MRSA will never be combated.

\textsuperscript{77} The Hospital Infection Society
\textsuperscript{78} The Royal College of Nursing
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