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MRSA Origins - A study to identify and determine the significance of attributional bias in the control and prevention of meticillin-resistant Staphylococcus aureus (MRSA) in healthcare settings

Final Report

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Research partnership

This project was a partnership between academic and clinical researchers. The **Lewisham Hospital NHS Trust**, located in South London, has an international reputation for undertaking leading edge laboratory-based and applied clinical research in infection control. The Trust is recognised nationally for its research on infection control and until recently it was one of few hospitals to routinely undertake patient screening for MRSA upon admission. The **National Nursing Research Unit** (NNRU) based at King's College London undertakes research about the configuration and impact of the UK nursing workforce. The NNRU is an established unit with 30-years experience of contributing to policy and practice development.

Peter Griffiths provided supervision, overall responsibility for research governance and the delivery of the project. **Elizabeth Morrow (née Smith)** coordinated the project, developed and used data collection tools, led on the analysis and writing of this report. Research undertaken in the clinical setting was overseen by **Gopal Rao**. **Debbie Flaxman**, a consultant nurse in infection control supported engagement and liaison with NHS staff. **Mehool Patel** provided advice on infection control in care of the elderly, local discharge practices and policies. Advice on patient and public involvement was provided throughout the project by **Sally Brearley**. **Trevor Murrells** provided statistical advice. **Rebecca Blackwell** provided research support for data collection, transcribed the focus group data and led on the development of the information resource.

The study did not involve the collection of any personal or sensitive information, either from staff or patients. All participants gave their time voluntarily and were free to decline or withdraw at any time. Each person was asked for permission for their views to be recorded, transcribed and selected quotations to be used in this report. Some participants preferred to remain anonymous and we have assured this request here by only using participants' job titles or a reference code. We sought and gained research ethical approval for the work from Lewisham Research Ethics Committee (Ref: 08/h0810/37).

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Reducing healthcare associated infection (HCAI) saves lives and improves patient well-being. Lower infection rates relieve pressures on staff who are delivering care and reduces hospital expenditure. Meticillin-resistant *Staphylococcus aureus* (MRSA) is a particularly widespread and well-known form of HCAI within the United Kingdom healthcare sector.

1.2 *MRSA transmission between hospital/care home*

Although the human, environmental and organisational contextual causes of infection are being more widely acknowledged in policy and clinical leadership, there remain considerable ambiguities about the causes and spread of MRSA across healthcare systems and within communities. The transition between hospital and care home (and back) provides an important test ground for examining staff views about the origin and cause of infection spread.

1.3 *Staff infection control behaviours*

Advances in HCAI policy and practice have not necessarily impacted upon individual staff behaviours and most HCAIs continue to result from cross-transmissions related to poor infection control practices. Previous studies of staff behaviour have tended to be based on a simple 'education – knowledge – compliance' model which does not always lead to improvements in infection control practices.

1.4 *Causal attributions*

Causal attribution theory may help to explain how individual professionals and teams make judgements about infection control practices in the contexts they are working within. Theorised attribution biases include:
- the kinds of information and decisions that people use to determine cause (Actor information bias),
- their situated position in relation to an issue (Observer/actor bias),
- internal and external attributions of cause (Situation/disposition bias),
- the effects of group processes and thinking (Normative bias),
- the kinds of motives which influence behaviour (Motivational bias).

1.5 *Applying causal attribution theory*

Within infection control research, causal attribution theory has largely been used to study locus of cause, human responsibility for infection, and links between perceptions of risk and behaviour. The interlinking of infection control practices with cognitive, organisational and environmental influencing factors has received little research attention. In this study we have employed attribution theory to assess the kinds of information that people use to determine causality of MRSA, the kinds of causes that they distinguish, and the rules they use for going from information to inferred cause.

Section 2: MRSA Origins study

2.1 Aims

The overall aim of the study was to determine whether healthcare staff hold attributional biases about MRSA and to expolore potential effects on staff infection control behaviours at an individual and collective (team) level on both sides of the hospital/care home interface.

2.2 Methods

Personal estimates (n=97 staff) and focused discussion groups (6 care home and 8 hospital) were used to elicit staff perceptions of prevalence, risk and sources of MRSA within their own organisations and in relation to the hospital/care home interface. The analysis focused on identifying confirmatory/contradictory evidence in the data to support or contest theorised attributional bias. Early findings from the research were disseminated to staff with a view to informing inter-organisational infection control practices which take on board potential attribution biases.

2.3 Study context

Previous hospital analyses of the local region show that a small percentage of patients are admitted with MRSA (3.3% in 2008) and some acquire MRSA in hospital and go to their own homes or care homes. However, overall MRSA prevalence in older patients (over 75 years of age) is higher (6.3%). Many care home residents admitted to the hospital are "decolonised"- at least temporarily in the hospital setting (67%). Work to assess the epidemiology of MRSA at the hospital shows that although hospital acquired cases are declining there is a relative increase over time in previously known cases of MRSA (33% in 2008 versus 6.7% in 2004/05). Thus, prevention and control of HCAI in older people should include the institution of good infection control practice not only in the hospital but also in care homes.

Section 3: Results

3.1 Study sample

The MRSA Origins study included a range of qualified and unqualified staff groups (nurses, healthcare assistants, therapists, facilities staff) who are closest to infection control issues at the interface between acute-care and long-term settings (44 hospital staff and 53 care home staff). Most staff had recent training on infection control, although training in care homes tended to be less recent with large numbers not having received any training in the last year.

3.2 Staff estimates

- Staff generally perceive the risks of MRSA to be high, however staff find it difficult to estimate prevalence and transmission of MRSA in relation to their own work environments.
- Most staff believe the prevalence of MRSA is lower in their care environment compared to other similar care settings and the majority of staff in both

hospital and care homes were clear that most people who got MRSA got it in settings other than their own.

- Staff tend to attribute the source of MRSA in health care settings to other staff.

3.4 Staff perceptions

Actor information bias: Staff say that general awareness of MRSA has improved and that their views about MRSA are 'informed'. However, the consistency of information use is uncertain and individuals cite many different types of evidence and the content and frequency of education and training can be variable. Staff are very aware of differences in availability of information about patient MRSA status between hospital and care home settings.

Observer/actor bias: Staff tend to attribute the origins of MRSA elsewhere, that is to other health care settings or public spaces rather than the one they are working in. Staff tend to associate cause of MRSA with organisational reputation for poor infection control and poor cleanliness.

Situation/ disposition biases: Staff tend to attribute self causes of MRSA to times and places of close inter-personal contact (care giving, washing, feeding, invasive procedures). Team attributions of cause are perceived as being attributable to 'lapses' in infection control and resource issues. More often staff attribute cause to external factors including: individual patient characteristics (age, poor general health status, previous positive screen for MRSA); patient movement between care settings/ transportation; visitors/relative's poor infection control; poor staff knowledge, laziness and resource shortages in other health care organisations; health system wide issues/policies and management; social issues of antibiotic usage; and places of close public contact e.g. buses and waiting rooms.

Normative bias: Staff who work closely together establish strong views about what is normal and acceptable infection control. Staff often monitor and encourage each other, students and agency staff to adhere to local infection control policies and practices.

Motivational bias: Negative motivational biases can include aspects of personal safety, fear of blame or stigma, 'bad press' from the media/public opinion, whilst positive motivation includes willingness to behave in accordance with clear organisational policies and encouragement from specialist infection control colleagues.

3.5 Interaction effects

- The combined influence of information and normative biases mean that misperceptions about MRSA rates may be maintained at individual, team and organisational levels.
- Situation/disposition biases are closely related to notions of where risk is coming from and where responsibility lies. Hence, because staff tend to attribute the causes of MRSA to external (not self) human factors including patient risk factors and poor infection control practices of others they may not feel motivated to improve their own practices.

- Strong motivational biases and normative bias can mean that staff teams tend to attribute group successes to dispositional attributions (good team infection

control policy and performance) and attribute failures in team infection control to situational attributions (client group, patient movement through systems of care, work pressures).

3.6 Potential effects

Information needs: Differences in the kinds of information health care staff use to determine causality of MRSA mean that there is strong possibility for variation in the quality of infection control knowledge between organisations. This could mean that there is a need for leadership and support to help staff recognise their training and education needs and to provide more accessible information for patients and visitors.

Lack of ownership: Staff are likely to underestimate the risk of MRSA transmission in relation to their own care environment and to focus on human causes of transmission. This could mean staff perceive risk and responsibility to be greater elsewhere.

Quality differences: Group processes can support team collegiality and confidence to contest poor practice but they can also mean that teams distance themselves from 'failing' parts of the organisation or health system. This could further contribute to variations in the quality of infection control practices between teams and organisations.

Section 4: Conclusions and implications

4.1 Three overall conclusions drawn from this study can help to explain staff behaviours:

1. Staff use a wide range of types of information to determine causality of MRSA within their own organisations and in relation to the hospital/care home interface. However, consistent organisational and inter-organisational information about prevalence is lacking, which could explain why staff tend to estimate risk in relation to their own care environment as being low.

2. Staff tend to attribute the causes of MRSA to external (not self or own team) human factors including patient risk factors and poor infection control practices of others. Staff less readily accept the possibility of transmission within their own care settings, and attribute this to situational factors (high-volume of high risk patients, time pressures/understaffing, and lack of resources).

3. The 'rules' staff use for going from information to inferred cause include:

   - *Staff make use of what they know* - Staff tend to draw information about infection risk from past experiences of known cases of MRSA, for example where patients were admitted from and their personal characteristics (age, health care status, invasive treatment/open wounds).

   - *Staff want to do well* - Staff tend to say they know they are doing well when they follow locally defined infection control practices. Staff attribute failures in team infection control to 'lapses' brought about by situational factors (client group, patient movement through systems of care, work pressures).

- *Staff want their efforts to be acknowledged* - Staff teams tend to attribute group successes to dispositional attributions (good team infection control policy and performance). The desire to be seen to be making an effort and achieving improvements are perceived as being important for gaining public confidence.

- *Staff want to know colleagues elsewhere are making the same effort* - Staff tend to attribute outsider group failures in infection control to human factors (poor infection control knowledge or laziness) rather than to situational factors (such as lack of infection control information or resources).

4.2 Implications for policy, research & practice

Overall, there is potential to recast infection control policies and interventions to help staff understand and engage with their own information needs, ownership of the problem, and quality assurance. Implications for policy, practice and future research include:

(i) ***Current successes in controlling infections in hospitals may be vulnerable as attention focuses elsewhere.*** Recent campaigns to control infections in hospitals have been hugely successful. As it is now recognised that the problem is not restricted to hospitals, as pools of colonisation exist in the community, attention will need to shift to other settings. However the attribution biases identified will need to be considered since they present a challenge to initiating effective action elsewhere. Focus on out of hospital sources of infection also raise the possibility that ownership of the problem by hospital staff may be undermined and lead to a diminution of effort and focus in that setting. As campaigns are developed the potential unintended effects in hospitals need to be considered and efforts made to mitigate this risk.

(ii) ***Further research is needed to find ways to examine and assess the 'everyday common-sense judgements' that staff make.*** This study found that because of motivational biases staff are not generally comfortable making estimates about their own behaviours or performance or those of others. It is important to find acceptable and accurate ways of understanding personal views about risk, prevalence and sources of infection between staff working in the same care settings so that infection control policies and practices can be further developed to work with rather than against these natural tendencies.

(iii) ***Further research is needed to examine intrapersonal biases between staff and patients and their effects.*** Interaction and professional relationships between colleagues have a strong controlling influence over determining what normal and acceptable infection rates and practices are. These types of 'intrapersonal' biases are likely to inform and influence everyday interactions between patients and health care professionals however they are a poorly understood phenomena of healthcare team working.

(iv) ***To be more effective infection control policies should recognise issues about uncertainty and motivation.*** A consequence of ambiguity and group norms can be a potential complacency as MRSA infection is seen as something caused by others which happens elsewhere. Hence it is important that infection control policies and protocols recognise issues about uncertainty and motivation to help overcome differentials in information, ownership and quality of infection control practices.

(v) **_Strategic infection control initiatives could encourage staff to work with colleagues and patients to tackle barriers to infection control by engaging with the natural tendency to attribute cause to human factors._** Attribution bias can mean that often attention is fixed on the human causes of infection, such as poor knowledge or hand hygiene, rather than including wider situational causes such as having better access to training or hand washing facilities. However, infection control initiatives could key into this natural tendency for staff to see infection as a human interaction problem that requires a human interaction response.

(vi) **_Ward- and unit managers have a key role to play in linking between organisations and assuring that staff are aware of their performance and education needs._** Staff tend to rely on organisational information about infection rate and performance. This means that ward and unit managers have an important role to play in encouraging clinical teams to learn from teams elsewhere about infection control issues and best practice.

(vii) **_Education that is directed towards staff understanding their own practices is likely to increase ownership of the problem._** Staff are likely to attribute success and good performance outcomes to their team's adherence to infection control practices and there is good reason to believe that where education is directed towards staff understanding their own practices it is more likely to lead to increased ownership of performance outcome measures for infection control. The simple model developed in this study could be adapted and applied to examine team contexts or specific types of infection control issues, such as education needs, routine infection control practices or patient information needs. It acknowledges that staff behaviours are complex and linked to issues about information, role responsibilities, perceived prevalence, risks and sources of MRSA, what is perceived as normal and acceptable, and the differing end-goals that individuals and teams aim to achieve.

Section 1: Introduction

SUMMARY

- *Healthcare Associated Infection*

  Reducing healthcare associated infection (HCAI) saves lives and improves patient well-being. Lower infection rates relieve pressures on staff who are delivering care and reduces hospital expenditure. Meticillin-resistant *Staphylococcus aureus* (MRSA) is a particularly widespread and well-known form of HCAI within the United Kingdom healthcare sector.

- *MRSA transmission between hospital/care home*

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  Advances in HCAI policy and practice have not necessarily impacted upon individual staff behaviours and most HCAIs continue to result from cross-transmissions related to poor infection control practices. Previous studies of staff behaviour have tended to be based on a simple 'education – knowledge – compliance' model which does not always lead to improvements in infection control practices.

- *Causal attributions*

  Causal attribution theory may help to explain how individual professionals and teams make judgements about infection control practices in the contexts they are working within. Theorised attribution biases include:
  - the kinds of information and decisions that people use to determine cause (Actor information bias),
  - their situated position in relation to an issue (Observer/actor bias),
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  Within infection control research, causal attribution theory has largely been used to study locus of cause, human responsibility for infection, and links between perceptions of risk and behaviour. The interlinking of infection control practices with cognitive, organisational and environmental influencing factors has received little research attention. In this study we have employed attribution theory to assess the kinds of information that people use to determine causality of MRSA, the kinds of causes that they distinguish, and the rules they use for going from information to inferred cause.

1.1 Healthcare Associated Infection

The human and economic costs of Healthcare Associated Infection (HCAI) are well known and have been brought into sharp focus by Healthcare Commission investigations (HC, 2008) and sustained media interest. Reducing infection rates across the National Health Service (NHS) and improving hospital cleanliness is high on the political agenda (DH, 2006; 2008). At the same time modern health care is more ambitious and efficient than ever before. The risks of infection for patients increase with higher volumes of work, greater numbers of older and sicker patients, and the use of complex interventions and technology (Gould 2005).

Meticillin-resistant *Staphylococcus aureus* (MRSA) is a particularly widespread and well-known form of HCAI within the UK healthcare sector. MRSA can cause serious illness and results in additional healthcare costs. Microbiology and epidemiology have made significant contributions to reducing MRSA rates within NHS organisations and national standards have been set for NHS and social care providers (DH, 2006). Programmes which use contact precautions for patients colonised or infected with MRSA, together with the promotion of hand hygiene and additional environmental cleaning have been shown to be successful at reducing MRSA transmission (Gillespie et al., 2007) and reducing infection spread (Pittet et al., 2000; Pittet et al., 1996).

1.2 MRSA transmission between hospital/care home

Although the human, environmental and organisational contextual causes of infection are being more widely acknowledged in policy (DH, 2008) and clinical leadership (HPA, 2008), there remain considerable ambiguities about the causes and spread of MRSA across healthcare systems and within communities. Previous studies have focused on prevalence and transmission within acute hospitals. HCAIs have often been wrongly classified as community acquired (Tacconelli et al. 2004) and the identification of reservoirs of colonisation in Care homes creates further ambiguity about the sources of MRSA (O'Sullivan et al. 2000) and rates of transmission over time (Mackenzie et al., 2007). Conversely staff in Care homes may not recognise the potential for transmission or may over estimate the risk. In the absence of information about where the risk of MRSA is coming from colonisation and infection could be seen as something caused by others which happens elsewhere.

The transition between hospital and care home (and back) provides an important test ground for examining staff views about the origin and cause of infection spread. Residents of Care facilities are known to be a high risk group for MRSA colonisation. Commission for Social Care Inspection (England) data show that in the year 2005–2006, 27% of older people's nursing facilities did not meet national minimum standards for hygiene and infection control. Similarly the Care Commission in Scotland found that in 21% of the inspected did not meet at least one recommendation about infection control and of these 10% did not meet a regulatory requirement. Other more limited audits using self completion questionnaires also suggest that implementation of the standard infection precautions are inconsistent. However, many of the measures such as screening, isolation and decolonization of MRSA colonized patients commonly undertaken in hospitals are not recommended in Care homes because these facilities are considered as a person's domicile. Furthermore isolation may lead to social exclusion and stigmatisation and decolonisation procedures may contribute to the development of antimicrobial resistance (Bradley 1997). As a result, current national guidelines in England recommend that care home residents should not be routinely screened for MRSA colonization, decolonized or isolated. Instead, the guidelines recommend that

good hand hygiene and use of standard infection control precautions will minimize the spread of MRSA (Coia et al. 2006). Consequently basic hygiene precautions in care homes are potentially of great significance.

The risk of transmission within care homes remains unclear. Research by Bradley (1997) found that most residents acquire MRSA during a hospital stay, not in the care home. In the care facilities they studied, asymptomatic MRSA carriage was common, but patients did not appear to have the same risk of acquiring MRSA in the care home as in the hospital setting. A prevalence survey of MRSA in nursing home residents in Germany (von Baum et al. 2002) revealed a relatively low rate of infection (1.1% amongst 3,236 residents). Admission to a hospital during the preceding 3 months was found to be a significant risk factor for MRSA carriage. The researchers concluded that residents seemed to acquire their MRSA in hospital and transfer it to their nursing home. Research from the United States (Crossley 2001) and from Northern Ireland (Baldwin et al., 2009) also suggests that transmission of antibiotic resistant bacteria and the development of infection in care homes are both uncommon events. Again, it appears that carriage of MRSA from acute settings into long-term care settings is more frequent.

In a prospective study undertaken in a French teaching hospital, Lescure et al. (2006) studied 198 patients with MRSA or methicillin-susceptible S. aureus infection and 198 control patients. They showed a highly significant independent association between MRSA infection at admission to the hospital and prior receipt of home nursing care (odds ratio [OR], 3.7; P < .001). However, other independent risk factors were prior hospitalization (OR, 3.8; P< .001), transfer from another institution (OR, 2.3; P = .008), and age older than 65 years (OR, 1.6; P = .04).

When considered together these previous studies suggest that that being a resident of a care home is an independent risk factor for MRSA acquisition in the community, but that the 'reservoir' in care homes probably consists of MRSA carriers discharged from the hospital. Such ambiguity provides a fertile territory where the source of the 'problem' can easily be located on the other side of the hospital/care home interface, potentially leading to complacency and a lack of ownership amongst staff in both settings.

1.3 Staff infection control behaviours

Advances in HCAI policy and practice have not necessarily impacted upon individual staff behaviours and most HCAIs continue to result from cross-transmissions related to poor infection control practices (Pittet, 2004). Previous studies of staff behaviour have tended to ascribe poor practice simply to a lack of staff knowledge, for example, of the risk factors for MRSA (Parish, 2005), its signs and symptoms (Beer and Fear, 2007), diagnostic testing (Banning, 2005), management (Alex et al. 2007), treatment and advice (Easton et al., 2007). The solution has generally been to reinforce staff compliance with infection control practices through education and surveillance. Yet, provision of education frequently fails to improve knowledge and good knowledge does not correspond well with good practice (Chan et al., 2002; Wong and Tam, 2005). Such approaches can do little but conclude that failure to comply with practice is irrational, overlooking the important possibility that, in the context of ambiguity, staff may hold false perceptions and make false attributions of cause.

The challenges of assuring even simple behaviours, such as handwashing, require more sophisticated and contextually-located analyses of staff perceptions and responses to

preventative strategies (Miyachi et al., 2007). Theories from behavioural science have shown some promise in explaining infection control behaviours (Pittet, 2004). For example, the Theory of Planned Behaviour (Ajzen, 2002) has been used to test staff intentions towards specific infection control measures, such as understanding compliance with hand hygiene recommendations, or physicians' intention to wear gloves during patient care (Pittet, 2004). Such approaches illustrate that the pathway between knowledge, attitudes, norms, intentions and behaviours is complex.

1.4 Causal attribution theory

Causal attribution theory offers a possible framework to examine cognitive variables that underpin staff infection control behaviour, including knowledge, motivation, intention, perception of threat, outcome expectancy, perceived behavioural control and social pressure. Causal attribution theory may also help to expand beyond a compliance model of infection control to encompass understandings about how individual professionals and teams make judgements about infection control practices in the contexts they are working within.

Causal attribution theory concerns how people make 'common sense' explanations about the world (Hewstone 1989). The theory is founded within social psychology and it relates to fundamental questions about how individual people, groups and societies make attributions of cause and draw links between perceived causes and consequences (including behaviours) (Kelly and Michela 1980). Specific types of attribution biases are summarized in the following table (Table 1).

Taken together causal attribution theories emphasise that to understand human behaviour it is important to take into consideration:
-   the kinds of information and decisions that people use to determine cause,
-   a person's situated position in relation to an issue,
-   internal and external attributions of cause,
-   the effects of group processes and thinking,
-   the kinds of motives which influence behaviour.

These theories also emphasise that to analyse human behaviour it is important to take into consideration what a person was trying to achieve by a particular action (Jones and Davis 1965). Understanding 'end-goals' may help to explain a person's actions in terms of their reasons or purposes for behaving in a particular way (Kruglanski 1980). Further dimensions to consider are the consequences that a person may expect to follow from a particular behaviour, such as previous experiences of success and failure (Harvey and Weary 1984) or a sense of coping or helplessness (Ashforth and Fugate, 2006).

The remainder of this section of the report looks at how causal attribution theory has been used in previous infection control research and explains the theoretical approach devised and applied in the present study.

Table 1: Summary of theorised attribution biases

Actor information bias	Different individuals formulate alternative judgements on the basis of information that is available to them and that they choose to draw upon. Kelly's (1979) work highlights that when the conditions of the decision change (more information is made available) people tend to arrive at different causal attributions.
Observer/actor bias	There can be differences between the view that someone on the 'outside looking in' might have compared to someone immersed within a particular setting or situation. Heider's (1944) work on naive psychology shows that outside observers are more likely to make a 'person' attribution than a 'situational' one because people are often seen as the first or primary cause of events.
Situation/disposition bias	Cause can be attributed to 'internal' (dispositional) or 'external' (situational) factors. Situational factors are generally thought of as being and beyond a person's control, whilst dispositional variables are those which are perceived to make the individual responsible for the event. Heider (1944) importantly identifies that a situational/dispositional classification can encourage a narrow view of there being one singular overriding cause, when in fact often people tend to hold more complex views about causes.
Normative bias	Group and social contexts influence what is seen as normal and acceptable and what is not. The exact meaning of a cause may change over time, between perceivers and across situations (Weiner 1983). Group attributions of cause tend to relate to three underlying processes: - *locus* refers to the (familiar) location of a cause internal or external to the person or group; - *stability* refers to the temporal nature of a cause, varying from the stable (invariant) to the unstable (variant); whilst - *controllability* refers to the degree of volitional influence that can be exerted over a cause.
Motivational bias	The act of attributing cause can be seen to have three main functions (Scott and Lyman 1968): 1) to gain control - the motivation to achieve a degree of control over the physical and social world, by explaining or predicting the causes of behaviours or events. 2) to build self-esteem - the motivation to achieve success, or distance oneself from failure, or to explain performance outcomes. 3) self-preservation - the motivation to gain approval of others by presenting 'accounts' that are designed to gain approval and avoid embarrassment.

1.5 Applying causal attribution theory

Previous research

Few previous studies of infection control have made specific use of causal attribution theory to understand staff behaviours. More widely in health research causal attribution theory has been used to examine staff decision-making processes, patient behaviours including compliance and uptake of health promoting behaviours. Taken together these studies (summarized below) offer lessons for understanding the infection control behaviours of healthcare staff.

Actor information bias:

- Studies of clinical decision-making show that staff tend to draw selectively on available information to make judgements about risk and best courses of action (Carrico and Ramirez 2007). Biases in judgement can occur when knowledge is applied to particular clients and contexts. In the context of diagnostic reasoning (essentially making judgements about the causation of signs and symptoms) causal attribution theory has been used with some success to explain diagnostic errors (Funder 1987). Causal attribution thus seems important for examining staff decision-making about personal infection control practices.

- Clinical research in infection control has a wide and embedded influence on staff behaviours for example through screening programmes, antibiotic therapy and best practice guidance (Pratt et al. 2007). There are inconsistencies in the types of information that are available between service settings as much attention has focused on hospital statistics.

- Easton et al. (2009) show that public knowledge and perceptions of MRSA are predominantly gained through the media and there can be considerable gaps in knowledge. If a person knows someone who has had MRSA they are more likely to be knowledgeable about it, and more likely to think it is untreatable and almost twice as likely to be worried about contracting MRSA if admitted to hospital. Members of the public are unlikely to mention antibiotic prescribing by doctors or patient use of antibiotics as contributing factors to MRSA infection.

Observer/actor bias:

- Although clinical protocol, management, organisation and the environment are important components of infection control (DH 2006), little is known about how staff perceive and relate these factors to their own role, to team infection control practices, or to the work of staff in other organisations.

- Similarly, organisational mechanisms for supporting training, appraisal and clinical governance are known to be significant determinants of effective infection control practice and successful change (Griffiths et al., 2008). However, little is known about how staff perceive and relate these factors to their own role, to team infection control practices, or to the work of staff in other organisations.

Situational/disposition biases:

- Although it is known that infection control relates to a combination of human and environmental factors, such as clear and high visibility clinical leadership, team stability and morale (Griffiths et al., 2008), little is known about whether staff tend to attribute cause to personal/human factors or to external factors such as workloads and rates of infection.

- Work done in relation to staff perception of infection risk (risk for oneself, risk for others, severity, controllability, frequency) (Kouabenan et al., 2007) shows that certain factors, such as proximity to patients and length of service, tend to be accompanied by an underestimation of risk, while other factors like little education, working part-time, and a lack of experience tended to result in staff overestimation of risk.

- A study of health care staff working in a long-term care facility in the US showed nurses held variable perceptions about the real threat of MRSA (Wolf et al., 2008). Infection transmission and infection control practices were also variable. Only 59% of participants felt that MRSA posed a risk to patients. Nurses perceived patient behaviour (100%), lack of supplies (26%) and lack of information/communication (24%) as barriers to infection control. Notably, few staff cited personal factors, such as lack of knowledge, as barriers to infection control. Although this study was undertaken in a different health care context to the UK, these findings support the theory that staff tend to use situational factors to explain 'failures' in infection control.

- Small-scale qualitative research found that senior staff nurses (6 of 10) thought "MRSA is out of control so why bother worrying about it" (Lines, 2006). Whilst on one level this attitude may seem defeatist, it could indicate that dispositional attributions of cause enable staff to focus on addressing tangible patient need rather than managing unknown risk.

Normative bias:

- It is possible that false perceptions of normal and acceptable practice operate at a team or organisation level. Research on the use of 'universal' precautions shows that staff who do not subscribe to particular preventative measures are more likely to overestimate the degree to which colleagues undertake the same undesirable practices (Burns and Knussen, 2005). The degree to which individual staff are influenced by group norms may also be variable because of different group processes.

- Infection control behaviour is closely associated with professional role. In particular, compliance with MRSA precautions can be significantly variable between different groups of health care staff, with nurses tending to do better than physicians (odds ratio [OR], 0.35; 95% confidence interval [CI], 0.14 to 0.86), orderlies (OR, 0.37; CI, 0.2-0.69), visitors (OR, 0.2; CI, 0.08-0.49), housekeeping personnel (OR, 0.06; CI, 0.01-0.47); but worse than occupational and physical therapists (OR, 11.7; CI, 2.55-53.8) (Afif et al., 2002). It is possible that professional identities and hierarchies act as a barrier to staff working towards team approaches to infection control.

- Differences between the professions could be attributable to differences in education but it is more likely to relate to the tendency for infection control to be seen as a nursing issue (Crawford and Brown, 2008).

Motivational bias:

- Placing blame for infection elsewhere could have a self-protective function at a personal level. However, there are no previous studies to examine how such motivational biases may operate in the context of infection control.

- At a group-level false group consensus can provide increased support for an individual's own view of their behaviours, whether their view is correct or not. Staff may align their views with what colleagues think about infection risk and how colleagues are perceived to behave (Gill et al. 2006).

Application of attribution theory in this study

The MRSA Origins study aimed to evaluate whether healthcare staff hold attributional biases about MRSA and to what degree this affects commitment to infection control at an individual and collective (team) level. The study focused on the interface between acute and long-term residential care facilities. Further detail of the aims and methods are provided in section 2 of this report.

In this study we have employed attribution theory to assess the kinds of information that people use to determine causality of MRSA, the kinds of causes that they distinguish, and the rules they use for going from information to inferred cause. We have not aimed to make a judgement about the absolute accuracy of staff estimates of MRSA rates either in relation to their own work unit or other parts of the healthcare system.

Key features of the theoretical approach we have used are as follows.

- Attribution theory suggests that biases are interrelated and influence human behaviours. Hence, we have been aware of the possibility of interaction effects and behavioural consequences of causal attributions.

- Previous research indicates that the potential for bias can change over time, thus we have been open to the possibility that biases operate within and are affected by the presence of external influencing factors such as policy change.

- In relation to situation/disposition bias, we have used this notion to help identify and explain the kinds of causes that staff distinguish according to internal factors (personal and team) and to external factors (patient, visitors, team practices elsewhere, healthcare, social, or public factors). Thus, we are using these notions as an indication of participant's views about control and responsibility.

We have drawn key propositions from attribution theory to inform the analysis (Box 1). How these propositions were used in the analysis is explained in Section 2 of the report.

Although recent campaigns in the UK have successfully reduced rates of MRSA infection in the hospital the existence of pools of infection in the community means that risk remains high. This also opens the potential that staff in any care setting may underestimate the potential risk or become complacent – wrongly locating risk elsewhere. Since attribution theory suggests that causal attributions tend to be biased toward to external factors this raises the possibility that staff within a particular service setting tend to make incorrect estimates about the origin of MRSA. Indeed, staff may intentionally or unintentionally minimise personal responsibility by seeking an external explanation or explanations which otherwise minimise personal blame. Thus they will underestimate the likelihood of MRSA being acquired through their own personal acts and, in so far as they identify with their own workplace collective (team), will tend to overestimate the chances that an individual contracted MRSA elsewhere. The consequence of this is a potential complacency as MRSA transmission is seen as something caused by others which happens elsewhere creating a barrier to effective remedial action. The transfer of patients between hospitals and care homes provides a rich territory for exploring this phenomenon.

Box 1: Key attribution bias propositions

(i) Staff within a particular service setting tend to underestimate or downplay the likelihood of transmission within the setting where they are working.

(ii) Causal attributions tend to be biased toward external factors or explanations.

(iii) Staff estimate the likelihood of MRSA being acquired through their own personal acts as low.

(iv) Staff working in a particular health setting are more likely to attribute causes to situational (external) factors in their own settings and 'person' specific factors (internal) factors in other settings.

(v) Group members make dispositional attributions for their group's successes and situational attributions for group failures in infection control.

The following figure (Figure 1) represents theorised attribution biases as we have applied them in this study to guide our analysis of staff views of infection control issues.

Figure 1: Theorised attribution biases and staff behaviour
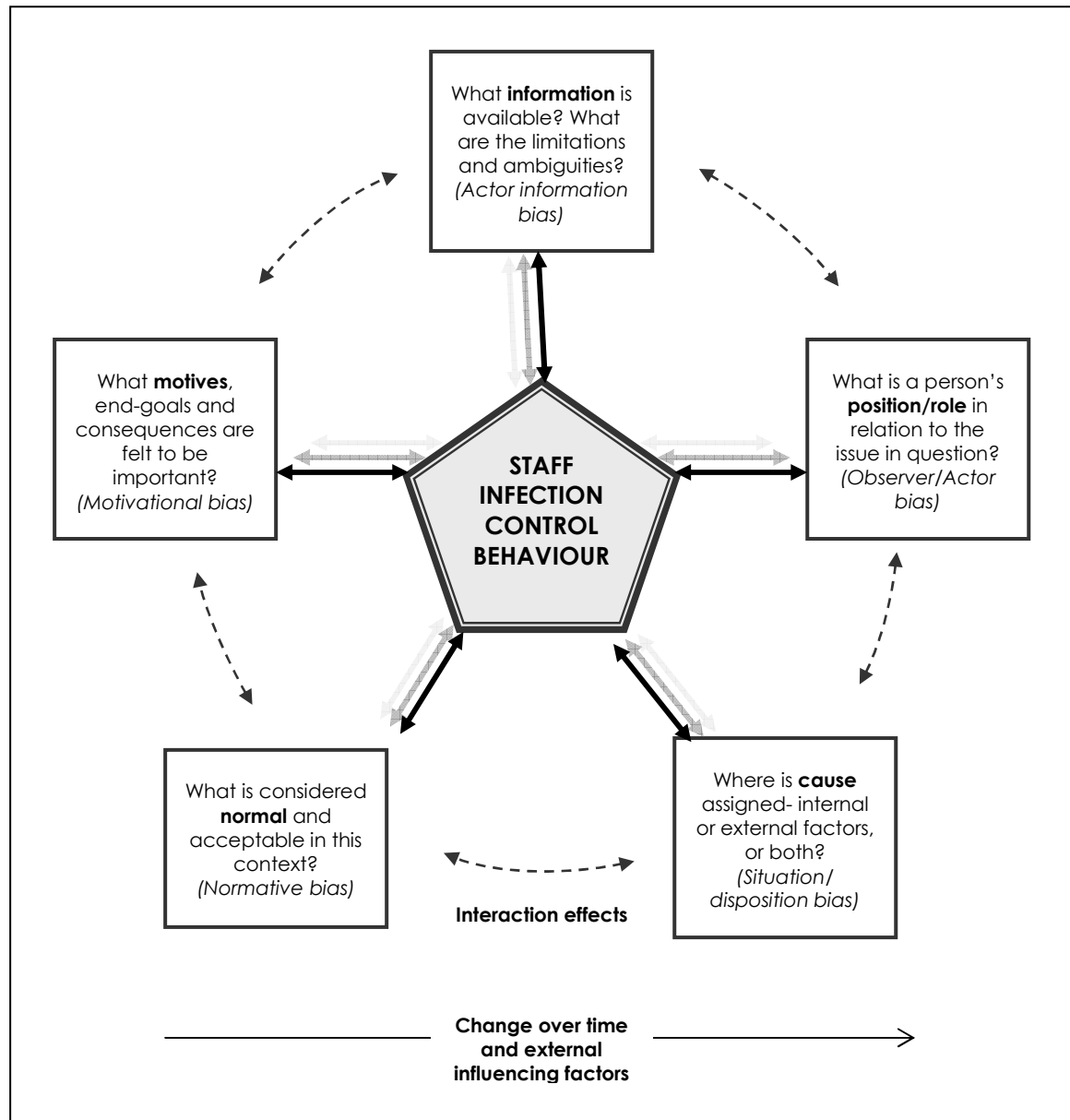
Section 2: MRSA Origins Study

SUMMARY

- Aims

  The overall aim of the study was to determine whether healthcare staff hold attributional biases about MRSA and to explore potential effects on staff infection control behaviours at an individual and collective (team) level on both sides of the hospital/care home interface.

- Methods

  Personal estimates (n=97 staff) and focused discussion groups (6 care home and 8 hospital) were used to elicit staff perceptions of prevalence, risk and sources of MRSA within their own organisations and in relation to the hospital/care home interface. The analysis focused on identifying confirmatory/contradictory evidence in the data to support or contest theorised attributional bias. Early findings from the research were disseminated to staff with a view to informing inter-organisational infection control practices which take on board potential attribution biases.

- Study context

  Previous hospital analyses of the local region show that a small percentage of patients are admitted with MRSA (3.3% in 2008) and some acquire MRSA in hospital and go to their own homes or care homes. However, overall MRSA prevalence in older patients (over 75 years of age) is higher (6.3%). Many care home residents admitted to the hospital are "decolonised"- at least temporarily in the hospital setting (67%). Work to assess the epidemiology of MRSA at the hospital shows that although hospital acquired cases are declining there is a relative increase over time in previously known cases of MRSA (33% in 2008 versus 6.7% in 2004/05). Thus, prevention and control of HCAI in older people should include the institution of good infection control practice not only in the hospital but also in care homes.

2.1 Aims

The overall aim of the MRSA Origins study was to determine whether healthcare staff in hospitals and care homes hold attributional biases about MRSA and to explore potential effects on staff infection control behaviours at an individual and collective (team) level on both sides of the hospital/care home interface.

The objectives were:

1) To determine staff estimates and prevalence and risk of acquiring MRSA in their own and other settings.

2) To explore for potential attribution biases in those estimates and identify the extent to which each staff from each setting locates the problems (causes of infection / colonisation) in the other.

3) To identify the kinds of information that healthcare staff use to determine causality of MRSA within their own organisations and in relation to the hospital/care home interface.

2.2 Method

Staff sample

The study explored the attributions staff make about MRSA transmission. Although different members of staff will have different levels of understanding and knowledge about MRSA the research looked at the relationship between attribution and the cognitive variables that lead to particular behaviour, rather than simply testing staff knowledge. A purposive sample of participants was recruited to represent staff groups who are closest to infection control issues at the interface between acute-care and long-term settings.

Recruitment

The 'Care homes' included in this study mostly offer a mixture of residential and nursing care facilities. A sample of 6 Care homes was selected from 12 local Care homes on the basis of: staff willingness to participate, homes providing nursing care, and suitable client group population (over 75s). Planning and organisation of the data collection was undertaken in collaboration with managers at each care home and with ward managers in the acute setting. A project flyer and posters were produced 'in-house' to explain the purpose of the research. In order to maximise recruitment to the study, we undertook data collection with acute-care and care home staff at localities and times that suited them, for example at the end or beginning of shift rotations. Eligible staff were invited (by letter) to participate in a personal estimation exercise (questionnaire) and a focused discussion with colleagues. Each participant was asked to provide written consent prior to their participation in the study. Participants were offered a small token of appreciation for their participation (an optional £10 gift voucher).

Staff personal estimates

We asked participating staff to complete a personal estimate exercise (Appendix 1). The aim of this was to elicit individual staff views about risk, prevalence and sources of MRSA. Participants were asked to privately estimate rates including:
- Prevalence of MRSA within their own organisation
- Prevalence of MRSA elsewhere (care home/hospital/home)
- The risk of transmission within their organisation
- The risk of transmission elsewhere (care home/hospital/home)
- How the rates they have estimated might compare with prevalence and transmission of MRSA across the acute sector/care homes nationally

Focused discussions

The next part of the research was to use focused discussions (as described in Krueger 1994). The group as a whole were asked to consider their answers to the personal estimate exercise and to discuss any variations (Appendix 2). The debates and discussions stimulated by the estimate exercise were audio-taped and transcribed in full. In view of the sensitivity of the issues which surround MRSA we chose to conduct the focused discussions with staff working in the same service organization rather than in mixed-organisational groups. Six focused discussion groups were conducted with staff in care homes (n=53 staff), and eight focused discussion groups were conducted with acute-care staff (n=44 staff). Each group involved between 4 and 11 participants. Further detail is provided in section 3.

Study context

In order to assess attributional bias it was necessary to establish an accurate picture of MRSA prevalence across the healthcare interface in question. The study used evidence from previous studies and analyses undertaken by the Infection Control Team, including routinely collected hospital data to inform the analysis (described in Section 2.3 of the report).

Analysis

Analysis of the staff personal estimate data (Appendix 5) was made in relative (greater than, less than) terms. We aimed to achieve at least 80 personal estimates (40 staff each setting). At the time of planning the study there was no data on variability of estimates from which to estimate the power of this study to detect differences but the study is sufficiently powerful to identify a difference in standard effect size (d) between the two groups of which 0.65 is considered 'large'.

The qualitative analysis of the staff discussion group data focused on identifying the range and relative significance of different forms of attributional bias. We made use of key propositions drawn from attribution theory (Box 1). To test these propositions we sought confirmatory/contradictory evidence in the data based on the following types of indicators:

- Evidence for how staff perceive and use information about MRSA and infection control. *(Information use)*
- Examples of staff attributing causes to 'person' factors and 'situational' factors, within their own unit of work and elsewhere. *(Attribution of cause)*
- Examples of staff judgements about responsibility, success and blame, in relation to their own infection control practices and to others. *(Attribution of responsibility)*
- Evidence of group and social processes influencing views about what is normal and acceptable infection rate and infection control practices. *(Group effect)*
- Examples of the types of end goals which motivate staff infection control behaviours. *(End goals)*

Each of the 14 discussion group transcripts were subjected to a content analysis using a code framework developed specifically for the research study (Appendix 4). The code framework was developed from the transcripts themselves by the research team identifying key terms and phrases that can be taken as indicator statements. For example the code category associated with the theoretical proposition 'Observer/Actor bias' includes key words such as 'threat' 'spread' 'problem' 'concern' etc. The code framework was suitably broad enough to

identify counter evidence, that is, examples of staff expressing views that were inconsistent with the identified propositions. The code framework was systematically applied to the data by searching for these key terms within each transcript and allocating codes to specific passages of text. To improve the consistency of the analysis different team members worked in combinations of two to analyse each transcript and team members met to discuss their interpretations.

Dissemination & development

The dissemination phase of this study was important for engaging staff working on both sides of the hospital/care home interface. Following the analysis of the qualitative staff data and the prevalence rates we aimed to present staff with actual figures for net contribution. These rates were provided anonymously to protect organizational confidentiality. The main way of disseminating this information was to hold a 'Dissemination and Development event' at the postgraduate centre of University Hospital Lewisham. The event allowed us to work with staff from the participating organisations to identify issues and problems for practice that may result from any discordance between perceived and actual transmission patterns for MRSA. A summary of the event is provided as an appendix to the report (Appendix 5).

The wider dissemination strategy for the study aims to connect with consumer action groups and networks such as MRSA Support and the Patients Association. We hope the executive summary provided in this report provides an accessible summary of the research findings.

Ethics

Research ethics approval for the study was gained from Lewisham Research Ethics Committee (Ref: 08/h0810/37). The Research Governance requirements of University Hospital Lewisham were met. Individual care homes elected to take part in the study and staff were informed that their participation was voluntary. The following ethical issues were given specific attention throughout the study:

(i)   Hospital patients were able to decline to take part in any screening programme at any time without fear that it will affect the care they receive. Patients are informed that their data may be used for the purposes of research about monitoring and controlling infection. Patient specific results are held securely on a hospital computer system. The research team did not have access to any personal information that is held about particular patients. Patient data was coded and personal information was retained by the hospital.

(ii)   The Department of Health recommends that in community settings patients who are known carriers of MRSA should not receive any clinical intervention for carriage, but that standard infection control practices should always be followed. This means that a patient would not be disadvantaged by not being routinely informed whether or not they have MRSA.

(iii)   Staff participants were given written information prior to agreeing to take part in the research and they were asked to provide written consent. Excerpts from transcripts were coded to ensure that individual staff cannot be identified or disadvantaged by their participation in this study.

The research team did not seek or know the personal MRSA status of any patient or staff member participating in the study. However, all organisations taking part in this study

subscribe to the National Guidelines for MRSA, including ensuring that patients who wish to know that they have MRSA are informed about what to expect and that patients will not be refused admission to a care home because they have MRSA.

2.3 Study context

In 2005 Lewisham Hospital reported 60 MRSA bacteraemias (an equivalent of 4.03 per 10,000 bed days), which were the third worst figures for a hospital in England. There had been several cases of MRSA non-bacteraemia infection, as well as MRSA pneumonias in intensive care and care of the elderly wards, MRSA wound infections in surgical and orthopaedic patients, MRSA Urinary Tract Infections (UTI) in medical and care of the elderly wards, and cases of MRSA infections in the community (Rao et al. 2007). The hospital's response was deep cleaning of wards and increased MRSA screening.

Screening all adult A&E admissions started in October 2004 and for all adult patients being admitted a nose and axilla swab are taken by clinical technician/nurse at time of blood tests. No wound swabs are taken unless clinically indicated. The Infection Control Team's rationale for implementing 'universal' adult screening for MRSA on admission to the hospital included the following: it detects nearly all carriers, it is easier to implement because it is not necessary to carry out a risk assessment on a case-by-case basis, it is more effective in reducing transmission, it is more cost effective than selective screening, it allows early and targeted use of anti MRSA antibiotics and it reduces MRSA in the health economy. Hospital MRSA statistics for MRSA are summarized in the following table (Table 2).

Table 2: Hospital MRSA admission statistics (October 2004-2005)

- 56.4% of adult emergency admissions (7,801 of 13,826 admissions by 6,469 patients) were screened for MRSA

- 433 patients (6.7%) were found to be colonized with MRSA

- 9.3% of patients with risk factors (366 of 3,952 patients) had MRSA compared to 2.7% of patients with no risk factors (67 of 2,450 patients)

- 1% of admissions were from care homes but accounted for 12.5% of all MRSA detected

- 25% of 'care home patients' were found to be colonised with MRSA on admission

Source: (Rao et al., 2007)

The hospital has since witnessed a substantial reduction in prevalence of MRSA in emergency hospital admissions in Lewisham (3.3% in 2008 versus 6.7% in 2004-5). These rates compare favourably to other hospital rates for example, recently published studies from Scotland and Guys and St Thomas' report prevalence rates of 6-7% for emergency admissions (NHS

Scotland 2009; Jeyaratnam et al 2008). MRSA colonisation rates at the hospital have declined significantly (as depicted in figure 2), and this is likely to be due to the introduction of alcohol hand gels, 'universal' screening in A&E and moving to a new hospital building.

Figure 2: Hospital MRSA prevalence rate (2000-2009)
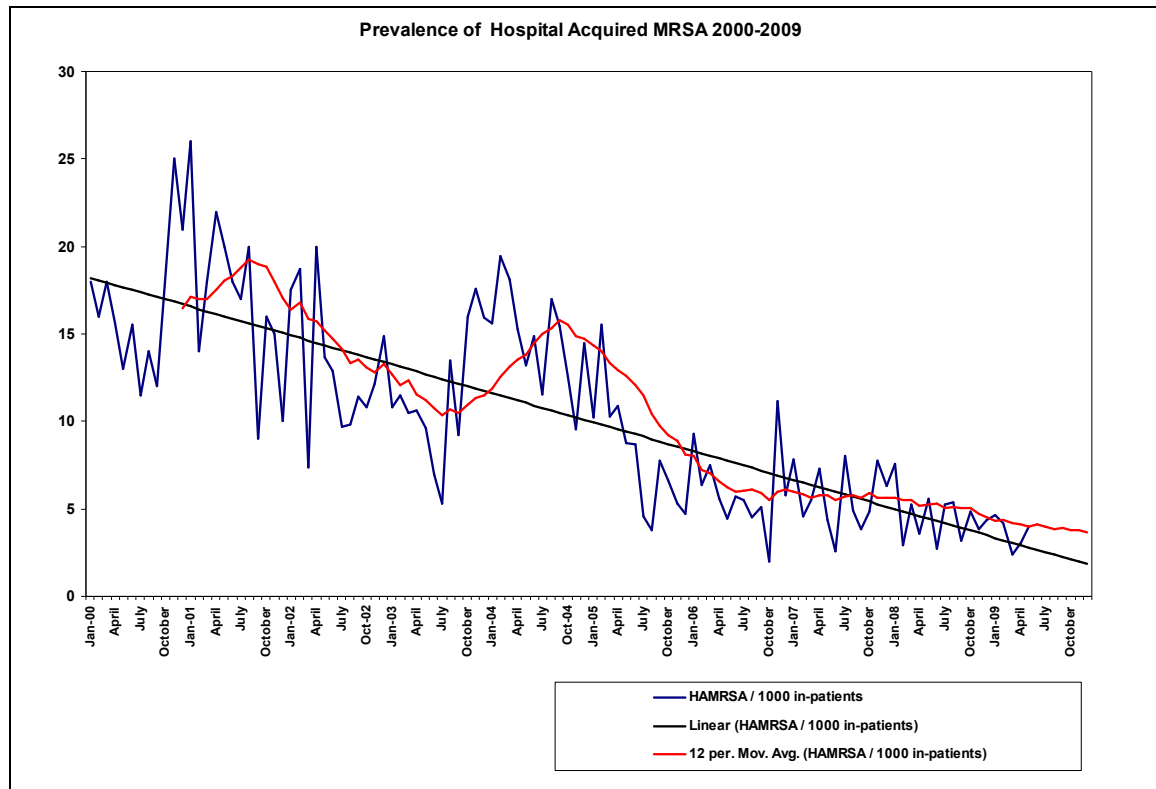
Work to assess the epidemiology of MRSA at the hospital shows that although hospital acquired cases are declining there is a relative increase over time in previously known cases of MRSA (Figure 4). The infection control team have undertaken further analyses to identify the type of patients who are being readmitted with a known previous positive MRSA screen.

Hospital analysis of patient data revealed that readmissions tended to be older patients, in particular patients being admitted to the hospital from care homes (Figure 3). The view was that prevention and control of HCAI in older people should include good infection control practice not only in the hospital but also in care homes. Despite the existence of guidelines, many care homes have been found to have unsatisfactory infection control support and this may lead to poor infection control practice in this setting.

Figure 3: Hospital MRSA epidemiology (2004-2008)
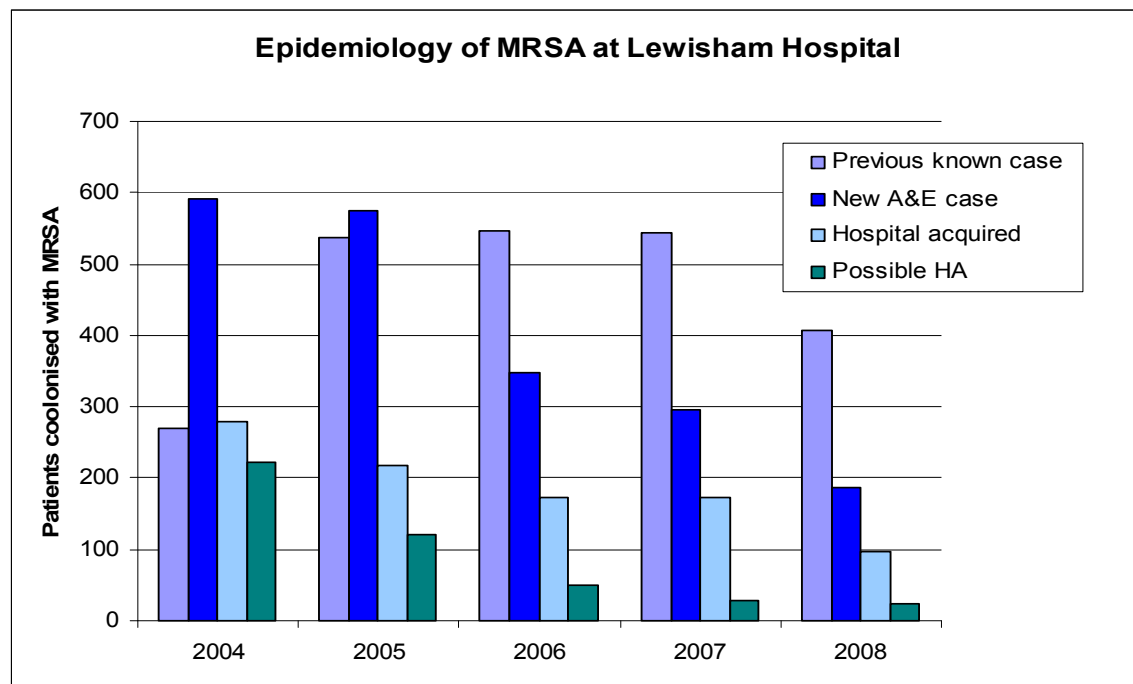
In response to these findings, the hospital infection control team planned and undertook a study (Rao et al., 2009) to look at the effectiveness of enhanced infection control support in improving compliance with infection control practice and MRSA rates in care homes in South London. The study period was October 2005- February 2007. Twelve care homes agreed to participate and were randomized into two groups of six according to number of residents. In the intervention group improved infection control measures were introduced (supported by a research nurse) including: better hand hygiene facilities, environmental audit and compliance with safe disposal of clinical waste audited by independent infection control nurses using previously validated community infection control audit tool. All staff were provided with personal alcohol-containing gels and a 24-hour telephone line for infection control support was set up. The hospital infection control team provided training for nursing and healthcare staff on infection control practice, environmental cleanliness, hand hygiene and disposal of clinical waste. Information was collected about care home resident characteristics and care home facilities. MRSA colonisation rates in consenting residents were recorded at the beginning and end of study.

At the end of the study infection control practice had improved in both care home groups. It was not possible to demonstrate that provision of short term enhanced infection control support had a significant impact on infection control practice in care homes. Greatest improvement was found in disposal of clinical waste and environmental cleanliness. Least improvement was in the availability of hand hygiene facilities. A key finding of the study was that MRSA colonisation rates are not reduced by enhanced infection control support alone (unpublished findings).

Subsequent work led by the hospital has included a pilot study on discharge screening in care of the elderly wards. The discharge screening pilot started in March 2008 on three care of the elderly wards. Patients are screened at admission and at discharge and information regarding source of admission and destination of discharge are recorded. Overall recording and screening has been variable and preliminary results (shown in figure 4) are being subject to further analysis using the hospital infection control database (Apr 2008-Mar 2009) and laboratory information systems (Jan-Dec 2008).

Figure 4: Pilot hospital discharge screening from care of elderly wards
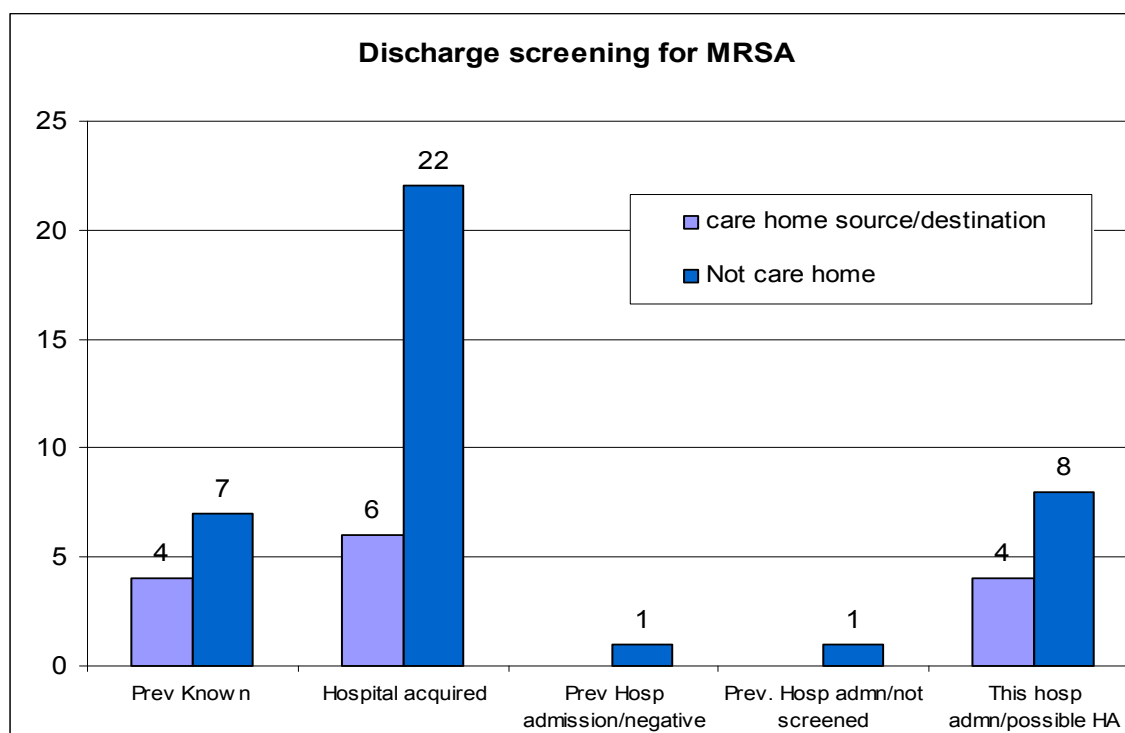
Table 3: Summary data discharge screening

Prevalence	Per cent
Admission MRSA prevalence	6.3
Discharge MRSA prevalence	7.4
Hospital acquired MRSA rate	5
Patients decolonized	67

Source: Laboratory Information system: 2008

Taken together these hospital analyses show that:

- A small percentage of patients are admitted to the hospital with MRSA (3.3%), and overall MRSA prevalence in older patients is higher (6.3%).
- Many care home residents admitted to the hospital are "decolonised" (67%) at least temporarily in the hospital setting.
- Given the overall reduction in MRSA prevalence in older patients being admitted to hospital, including those from care homes, MRSA prevalence in care home patients is likely to be substantially reduced as well.

Section 3: Results

SUMMARY

- Study sample

  The MRSA Origins study included a range of qualified and unqualified staff groups (nurses, healthcare assistants, therapists, facilities staff) who are closest to infection control issues at the interface between acute-care and long-term settings (44 hospital staff and 53 care home staff). Most staff had recent training on infection control, although training in care homes tended to be less recent with large numbers not having received any training in the last year.

- Staff estimates
  - Staff generally perceive the risks of MRSA to be high, however staff find it difficult to estimate prevalence and transmission of MRSA in relation to their own work environments.
  - Most staff believe the prevalence of MRSA is lower in their care environment compared to other similar care settings and the majority of staff in both hospital and care homes were clear that most people who got MRSA got it in settings other than their own.
  - Staff tend to attribute the source of MRSA in health care settings to other staff.

- Staff perceptions

  Actor information bias: Staff say that general awareness of MRSA has improved and that their views about MRSA are 'informed'. However, the consistency of information use is uncertain and individuals cite many different types of evidence and the content and frequency of education and training can be variable. Staff are very aware of differences in availability of information about patient MRSA status between hospital and care home settings.

  Observer/actor bias: Staff tend to attribute the origins of MRSA elsewhere, that is to other health care settings or public spaces rather than the one they are working in. Staff tend to associate cause of MRSA with organisational reputation for poor infection control and poor cleanliness.

  Situation/ disposition biases: Staff tend to attribute self causes of MRSA to times and places of close inter-personal contact (care giving, washing, feeding, invasive procedures). Team attributions of cause are perceived as being attributable to 'lapses' in infection control and resource issues. More often staff attribute cause to external factors including: individual patient characteristics (age, poor general health status, previous positive screen for MRSA); patient movement between care settings/ transportation; visitors/relative's poor infection control; poor staff knowledge, laziness and resource shortages in other health care organisations; health system wide issues/policies and management; social issues of antibiotic usage; and places of close public contact e.g. buses and waiting rooms.

Normative bias: Staff who work closely together establish strong views about what is normal and acceptable infection control. Staff often monitor and encourage each other, students and agency staff to adhere to local infection control policies and practices.

Motivational bias: Negative motivational biases can include aspects of personal safety, fear of blame or stigma, 'bad press' from the media/public opinion, whilst positive motivation includes willingness to behave in accordance with clear organisational policies and encouragement from specialist infection control colleagues.

- Interaction effects
  - The combined influence of information and normative biases mean that misperceptions about MRSA rates may be maintained at individual, team and organisational levels.

  - Situation/disposition biases are closely related to notions of where risk is coming from and where responsibility lies. Hence, because staff tend to attribute the causes of MRSA to external (not self) human factors including patient risk factors and poor infection control practices of others they may not feel motivated to improve their own practices.

  - Strong motivational biases and normative bias can mean that staff teams tend to attribute group successes to dispositional attributions (good team infection control policy and performance) and attribute failures in team infection control to situational attributions (client group, patient movement through systems of care, work pressures).

- Potential effects
  - *Information needs:* Differences in the kinds of information health care staff use to determine causality of MRSA mean that there is strong possibility for variation in the quality of infection control knowledge between organisations. This could mean that there is a need for leadership and support to help staff recognise their training and education needs and to provide more accessible information for patients and visitors.

  - *Lack of ownership:* Staff are likely to underestimate the risk of MRSA transmission in relation to their own care environment and to focus on human causes of transmission. This could mean staff perceive risk and responsibility to be greater elsewhere.

  - *Quality differences:* Group processes can support team collegiality and confidence to contest poor practice but they can also mean that teams distance themselves from 'failing' parts of the organisation or health system. This could further contribute to variations in the quality of infection control practices between teams and organisations.

3.1 Study sample

Participants

The MRSA Origins study included a range of qualified and unqualified staff groups who are closest to infection control issues at the interface between acute-care and long-term settings (in total n=97), detailed in table 4. We chose to focus recruitment on staff groups who provide a high-level of direct care to patients over 75 years of age.

The staff sample within care homes was strongly influenced by who was working and available on the particular day that the discussion group was scheduled. In most cases this was decided by the care home manager or senior nurse in advance and staff were notified of the date, in most cases 2-3 weeks prior to the discussion group. Care home staff were generally very keen to participate and willing to participate in the discussion groups, and were very appreciative of receiving a £10 gift voucher for their time. In some cases this lead to some large groups (up to 12 staff) but we did not wish to turn anyone away provided they had completed a consent form and were present from the beginning of the discussion group. All staff contributed something to the discussion. Although we provided information about the study and gained written consent for participation, it proved necessary to clarify the purpose and focus of the discussion group and to address any perceptions that it was a training event or test. One care home manager chose to participate in a discussion group, others did not request to be involved, explained they were too busy or they feared their participation may affect what staff said. One member of cleaning staff needed help from a member of the research team to complete the personal estimate exercise questionnaire because of reading problems.

Table 4: Staff participants

Hospital (n=44)	*Care homes (6) (n=53)*
• Qualified nurses (18)	• Qualified nurses (1 manager) (19)
• Midwives (4)*	• Unqualified nursing staff (2)
• Practice development manager (1)	• Healthcare assistants (26)
• Unqualified nursing staff (5)	• Activities co-ordinator (2)
• Healthcare assistants (1)	• Occupational therapist (1)
• Phlebotomists (3)	• Cleaning staff (2)
• Occupational therapist (2)	• Laundry staff (1)
• Radiographer (1)	
• Facilities managers (3)	
• Cleaning staff (2)	
• Catering staff (2)	
• Ward administrator (1)	

In the hospital setting it was not feasible to run discussion groups involving teams that were directly working together because of practical and safety issues of taking staff away from clinical duties. Instead, staff were recruited with the help of the Infection Control Team who helped to distribute project posters and directly notify department/ward managers. Groups participating in the hospital setting included facilities staff, therapists, link nurses, clinical

facilitators, and mixed groups of nursing staff working on general medical, surgical, intensive care and care of the elderly wards. We did not directly invite any doctors to participate in the study but we would have included any volunteers as this would have been a useful perspective on the issues.

*Four midwives were very keen to take part in the discussion groups because of setting up a programme of screening for women having elective caesarean sections at the hospital. We were grateful for their perspectives on the issues but have excluded their data from the staff estimation exercises (data presented in Section 3.2) where questions specifically relate to patients over 75 years of age.

Experience and training

Staff in hospital had been in their current post for a mean of 6.5 years and those in care homes 4.3 years. The difference was not significant (df 86, t=1.96, p=0.052). Most staff had recent training on infection control either with the last three months (41/95, 43.2%) or the last year (31/95, 32.6%) although training in care homes tended to be less recent with large numbers not having received any training in the last year (Fisher's exact p=0.012).

Table 5: Most recent training on MRSA

	Health care setting		Total
	Care Home	Hospital	
Never	3 5.8%	1 2.3%	4 4.2%
0-3 months ago	16 30.8%	25 58.1%	41 43.2%
In the last year	17 32.7%	14 32.6%	31 32.6%
1-3 years ago	14 26.9%	3 7.0%	17 17.9%
More than 3 years ago	2 3.8%	0 .0%	2 2.1%
Total	52 100.0%	43 100.0%	95 100.0%

3.2   Staff estimates

This part of the report presents results from the staff personal estimate exercise (questionnaire in Appendix 1). Quantitative results from the staff questionnaire are summarized in tables and bullet points are used to highlight key points about staff perceptions of risk, prevalence and sources of MRSA.

Risk

✧ **Staff generally perceive the risks of MRSA to be high.**

Notions of risk underpin many of the issues about causal attribution that we are interested in looking at. For example, estimation of the likelihood patients will contract MRSA within own work environment (discussed below), or identification of risk factors associated with MRSA (Section 3.3). It is therefore significant that more than half of all staff (52, 56.5%) regarded MRSA as posing a serious treat to society. Hospital staff tended to perceive the threat as lower (see table) compared to care home staff (Fisher's exact p=0.04) and such variations have previously been linked to length of work experience and education (see Section 1.5).

Table 6: Perceived threat to society

	Health care setting		Total
	Care Home	Hospital	
Minor risk	3	9	12
	5.8%	22.5%	13.0%
Moderate risk	13	15	28
	25.0%	37.5%	30.4%
Serious threat	29	16	45
	55.8%	40.0%	48.9%
Epidemic	7	0	7
	13.5%	.0%	7.6%
Total	52	40	92
	100.0%	100.0%	100.0%

Further dimensions of the issue of risk are presented in the following sections in relation to estimates of prevalence and sources of MRSA.

Prevalence

✧ **Staff find it difficult to estimate prevalence and transmission of MRSA in relation to their own work environments.**

The results of the personal estimate exercise showed considerable missing or invalid data. Within care home teams in particular personal estimates of the number of patients with MRSA varied greatly (see ranges for the six care homes shown in Table 7) even though staff were working in the same care home.

Table 7: Estimates of numbers of over 75s with MRSA in care homes

Care Home Ref.	n (missing)	Mean estimate	Range
1	9 (2)	3.22	0-8
2	8 (0)	3.25	0-20
3	2 (2)	8.00	6-10
4	10 (0)	7.4	5-11
5	9 (0)	1.1	1-2
6	11 (0)	4.09	0-10

Estimates of MRSA prevalence also varied greatly. Only 61 estimates of MRSA prevalence could be derived due to missing data or invalid responses (for example more cases than number of people over 75). The mean estimated prevalence across the entire sample was 33.6% with a range from 0 to 100%. Care home staff estimates of prevalence were generally lower than hospital staff (14.7% vs 72.5%, df 59 t=7.97 p<0.001) although the large number of logically invalid responses among hospital staff raises doubts over whether this calculated estimate reflects their actual beliefs.

Even fewer estimates of prevalence on admission could be derived from the questionnaire data (51 hospital and care home staff). Overall admission prevalence was estimated at 30.4%, but as described below there were significant differences between estimates provided by care home and hospital staff. Among those providing two estimates there was very little difference between estimation of prevalence on admission and overall prevalence (mean difference 0.7%, df50, t -.22, p=.827). Estimates of the prevalence of MRSA acquired in the current settings were lower at 11.7%, but again the number of valid estimates was low (48).

Estimates of both admission prevalence and prevalence of acquired MRSA were higher in hospital (60.5%, 19.0%) than in care homes (19.0%, 7.7%). Local data suggest that hospital staff may be greatly over estimating the risk of MRSA in older people on admission compared to known rates of 6.3% on admission and 7.4% on discharge observed among people over 75 locally (see study context data in Section 2.3). If care home clients admitted to hospital are representative of the overall population in care homes (prevalence of MRSA 25%), staff estimates from care homes are more realistic and indeed could be an underestimate of overall prevalence in the care home.

While we have some reservations about the validity of the estimation exercise because of inconsistencies in the way staff made estimates, the overall perceived risk of MRSA (perceived rate) is significantly higher in hospital than care home settings.

At first this over estimation by hospital staff seems to contradict the propositions we derived from attribution theory (see Box 1, Section 1.5). However, hospital staff perception of the threat posed to society by MRSA was lower than care home staff (Table 6) and since a high rate on admission is a substantial contributor to rates of transmission, the perceived high rates may reflect an attribution bias toward the situation rather than (personal) dispositional causes (such as poor infection control practice). In this way, perceiving high rates of MRSA on admission because of a concentration of high risk patients coming from the community would provide a logical causal explanation for MRSA risk in the hospital.

✧ **Most staff believe the prevalence of MRSA is lower in their care environment compared to other similar care settings.**

In both hospital and care homes most staff 62/83 (74.7%) believed that they had less people with MRSA than other similar settings (Table 8). There was no significant difference between hospital and care homes (Fisher's exact p=.934)

Table 8: Estimated number of people over 75 in own setting with MRSA compared to similar settings

	Health care setting		Total
	Care Home	Hospital	
Less	34	28	62
	72.3%	77.8%	74.7%
Same	8	5	13
	17.0%	13.9%	15.7%
More	5	3	8
	10.6%	8.3%	9.6%
Total	47	36	83
	100.0%	100.0%	100.0%

In both hospital and care homes a small majority (41/78 – 52.6%) thought that they had fewer people admitted with MRSA although numbers who thought that numbers were the same (33.3%) or higher (14.1%) were higher (see table 9). Again there was no difference between hospital and care home (Fisher's exact p=1.0).

Table 9: Estimated number of people over 75 admitted to own setting with MRSA compared to similar settings

| | Health care setting | | Total |
	Care Home	Hospital	
Less	24	17	41
	53.3%	51.5%	52.6%
Same	15	11	26
	33.3%	33.3%	33.3%
More	6	5	11
	13.3%	15.2%	14.1%
Total	45	33	78
	100.0%	100.0%	100.0%

Most staff believed that fewer people acquired MRSA in their setting compared to similar settings (63/82 76.8%) while few (7, 8.5%) believed that more people did. Again there was no difference between hospital and care home (Fisher's exact p=1.0).

Table 10: Estimated number of people over 75 acquiring MRSA in own setting compared to similar settings

| | Health care setting | | Total |
	Care Home	Hospital	
Less	37	26	63
	77.1%	76.5%	76.8%
Same	7	5	12
	14.6%	14.7%	14.6%
More	4	3	7
	8.3%	8.8%	8.5%
Total	48	34	82
	100.0%	100.0%	100.0%

These findings accord with the predictions of attribution theory in so far as there is a strong tendency for staff to judge the performance of their own setting in more favourable terms than comparable settings. However, where no adverse causal attribution related to self (either individually or as part of a group) is implied, as is the case when making judgements about number of patients admitted, staff tend to judge the situation to be much more similar.

Sources

✧ **The majority of staff in both hospital and care homes were clear that most people who got MRSA got it in settings other than their own.**

Care home and hospital staff groups differed significantly in their perception of where most MRSA came from (Fisher's exact p<0.001). While 45/53 staff in care homes (84.9%) attributed most MRSA to hospitals only 11/44 hospital staff (25%) did. Hospital staff identified a variety of places as the main source but clearly the perception was that the majority of cases originated in the community, including care homes. While both these perceptions could be correct for their own patients, since the populations admitted to hospitals and care homes differ, these findings clearly accord with the prediction – that irrespective of care setting most staff would tend to see the origin of the problem elsewhere (Table 11).

Table 11: Perceived sources of MRSA

Where do most people get MRSA?	Health care setting		Total
	Care Home	Hospital	
In their home	1	7	8
	1.9%	15.9%	8.3%
In a care home	0	7	7
	.0%	15.9%	7.3%
In hospital	45	11	56
	86.5%	25.0%	58.3%
In a public place	3	11	14
	5.8%	25.0%	14.6%
Hosp and care home	2	2	4
	3.8%	4.5%	4.2%
Combination including care home (not hospital)	0	1	1
	.0%	2.3%	1.0%
Other combination (not hospital or care home)	1	5	6
	1.9%	11.4%	6.3%
Total	52	44	96
	100.0%	100.0%	100.0%

✧ **Staff tend to attribute the source of MRSA in health care settings to other staff.**

Individual acts of other staff (staff not washing their hands) were perceived to be the leading cause of MRSA in health care settings. Other causes that would not implicate staff personally in attributing to the source of MRSA were also identified with some frequency, especially by hospital staff. Overall differences between hospital and care home staff groups were not significant (Fisher's exact p=0.078).

Table 12: Perceived cause of MRSA in health care settings

In health care settings, what gives most people MRSA?	Health care setting		Total
	Care Home	Hospital	
Touching dirty surfaces/rubbish	1	2	3
	1.9%	4.5%	3.1%
Staff not washing their hands	28	18	46
	52.8%	40.9%	47.4%
Germs spread through the air	4	0	4
	7.5%	.0%	4.1%
Visitors/family touching people	0	1	1
	.0%	2.3%	1.0%
Most people carry MRSA on their skin	6	12	18
	11.3%	27.3%	18.6%
Other	14	11	25
	26.4%	25.0%	25.8%
Total	53	44	97
	100.0%	100.0%	100.0%

3.3 *Staff* perceptions

This section uses focus group data to look in more depth at the reasons behind attributions of cause and staff behaviours. Quotations from the focused discussions are used throughout the section to highlight the issues in staff's own words. Quotations have been selected on the basis that they illustrate/contest theorised attributional biases or potential effects for infection control practices. After each quotation (CH) indicates care home discussion group and (H) indicates hospital discussion group. Bullet points are used to highlight key points in relation to each of the five types of attribution bias studied here.

(i) *Actor Information Bias – "Information Use"*

According to the theory of information bias different people receive and seek different information, information is not always available to everyone and different people are influenced by different types of information. Although these propositions seem obvious, an aim of this study is to look at the kinds of information that people use to determine causality in the context of infection spread and control.

◇ **Staff say their views about MRSA are 'informed', however, the consistency of information use is uncertain and individuals cite many different types of evidence (research, policy, personal experience of care)**

We found evidence of unit-level variation in access to information about infection control practice- largely because of the types of educational programmes that were or were not being followed and the influence of senior clinical staff who were knowledgeable of infection control practices. In the hospital context the Infection Control Team was a significant source of information and guidance.

An important component of the issue of information is what can and can't be known, as distinct from areas of poor knowledge that can be addressed. Staff participants said they 'know' about certain things including: the age range of patients/clients they generally care for, that certain patients/clients have MRSA (shown by the result of a positive screen), that certain patients are more susceptible to contracting MRSA, that for certain patients MRSA will have serious effects, and that MRSA is difficult to get rid of. In general staff were confident that they knew when they were using good infection control, as illustrated by the following quote from a care home discussion group:

"You know, infection control is good. You know you separate the bags, the plastic bags. You separate all bloods, different plastic bags. Red bags, yellow…you separate for the wash. And laundry knows" (CH3)

Staff also said they don't know certain things, including: whether most people carry MRSA on their skin, the types of strains that people can carry, what leads to people becoming seriously infected and whether they have MRSA themselves. Some of these uncertainties could be addressed by providing basic infection information.

"I don't know if we actually have accurate figures on the wards about how many actually do have MRSA" (H5)

Other types of uncertainties can not be as easily addressed, for example staff in some groups were unclear about the reasons behind changes in screening and treatment regimes, and the reliability or timeliness of screening results. Some uncertainty could be addressed by having clearer information about organisational decisions about infection control and the rationale behind organisational policies.

⬧ **Staff say that staff and public awareness of MRSA has improved**

All staff said that they were more aware of MRSA through the media, and in particular high profile celebrity cases. In the hospital setting, staff felt that local newspaper reports of hospital league tables for infection rates were useful for publicising improvements in infection rates and raising awareness of MRSA generally. Staff were well aware that such information was in the public domain and could lead to public concern and overestimation of risk.

"Misinterpretation isn't it. You ask an average person in an age group 'where do you get MRSA?' the first thing they say is the hospital, they don't realise it's out in the community" (H6)

Because of media speculation the provision of accurate patient information through the health care system was seen as being essential for moderating public concern and engaging the public in infection control issues. Increased awareness of MRSA was generally seen as being positive for making infection control a priority and a habitual component of healthcare practice.

"It's not something that you really think about anymore, it is becoming habitual, that you do the hand gel and wash your hands…it has become so well publicised both in the hospital and in the general public" (H2)

⬧ **Staff say they access education and training but this can be variable in content and focus**

Information received through training or organisational newsletters was considered useful and informative. At the same time staff showed awareness of differences in the quality and sources of infection control education and updates between organisational contexts. A key factor is that staff in both the hospital and care home setting tend to award value to infection control information that is directly relevant to their own practice or organisation and that is provided in-house through training or newsletters.

"[The care home manager] takes us for every course.
Training, makes sure that everybody's been trained.
She takes lots, does a lot of the training herself, not leaving it to somebody else.
And we feel if we need more training we can also ask and she'll do it or she'll give us links and we can go and look it up on the computer, she's good on that" (CH4)

"Infection Control have a package that they give, particularly for our staff and is relevant to our staff" (H6)

Staff generally felt that the information about infection control they received from their organisation through training was dependable and helped them to set and maintain standards.

"I think if people are working and are ignorant of the facts they are not going to attain certain standards whereas if they know the facts and figures and what can happen, you know knowledge is power isn't it" (CH5)

❖ **Staff are aware of differences in the availability of information about patient MRSA status (in particular routine screening) between clinical settings**

The following quotes are from a single care home. They illustrate the uncertainty of 'knowing' whether patients are MRSA positive and uncertainty about actual rates of colonisation within the home.

"We don't know, but some people carry MRSA but they can be clear, but at the moment we feel we don't have MRSA here. That's how we feel" (CH2)

"Because people are not swabbed before coming in we don't know their status but when they are eventually swabbed and they become positive, we have already been dealing with them for a very long time" (CH2)

In another home, which was making use of routine screening, staff felt more informed and able to make an estimate of MRSA rates:

"I would say eight out of ten again because we swab them straight away and when they come back it is showing that they have MRSA" (CH1)

For the other care homes staff explained that in the case of patients admitted to the home from hospital or with a wound, it was more likely that a swab would be taken and their MRSA status would be known:

"If they come from home then we don't know whether they've got it or not, because they're not swabbed or anything. And if they've come from the hospital they've been swabbed so yes we know, yes they have" (CH5)

"These people who come to us and they are already diagnosed, it is already there, that is how we know if someone has got MRSA … at the moment my view is I don't have anybody diagnosed with MRSA. It doesn't mean we don't take any precautions" (CH2)

Groups working across both settings said that they prefer to know when patients have a positive MRSA status and that when they are aware of a patient's status they practice more rigorous infection control.

"Of course it is better to know, to protect not just ourselves, but for better infection control"
"I think it's better if they tell to us, we've got to protect ourselves more. Maybe double gloves" (CH3)

Overall, care home staff were generally uncomfortable about making estimates of MRSA rates within the home. In comparison staff in hospital settings generally have more information about patient MRSA status and rates. Yet even within hospital settings patients can be receiving care for some time and be transferred to different departments before admission screening results are known.

"When they go through A&E and they come on the ward, maybe they are on the general ward and they haven't been told that they have MRSA, and then a few days later, maybe a day or two later we go and tell them that they have MRSA. Some of them tend to think that they picked it up on the ward. We have to explain that actually, when you came in through A&E you had it, and that's when we get a lot of problems with families" (H1)

Hospital and care home staff recognised a tendency to perceive MRSA as coming from the hospital because this was the place where patients were diagnosed.

"We are not blaming the hospital, really not. Diagnosis is in the hospital that is why it is there really. The care homes as well, but the diagnosis is in hospital (…) Because you know we would not have cause to take it [MRSA swab] unless it has been something that has been continuously something wrong" (CH2)

At the same time some hospital staff believed that MRSA rates within the hospital were lower when compared to other hospitals because of routine screening in the Accident and Emergency Department and prior to admission.

"I read somewhere that we have one of the lowest rates in the country now, I don't know if that's true or not.
I think that's right, I think we're favourable compared to some other trusts" (H2)

Care home staff said that there was uncertainty about whether their clients picked up MRSA in the hospital or whether they already had it when they were admitted. To overcome this uncertainty, care home staff said it would be useful to have information about the patient's MRSA status on hospital admission, as well as on discharge.

"I know a lot of people come in with it, to the hospital, you know from the community into the hospital…I don't know what the percentage is.
Yeah, this is strange, we don't know those we get, those residents we get, if they had it before they went into hospital" (CH5)

The issue of frequent hospital readmission was also identified by hospital staff as a complicating factor in knowing where a patient contracted MRSA.

"Some come from nursing homes and they are previously known to us to have had MRSA before, so we know them. We just know they have had MRSA before, and some times they go back home to the nursing home with MRSA as well" (H2)

A lack of information about whether a patient is MRSA positive and where a person contracted MRSA could mean that it is difficult for staff to take greater ownership of the problem, as illustrated by the following example from a care home healthcare assistant.

"I think if we were to deal with MRSA in the manner in which we could reduce the spread then obviously we need to know the origin of where it is coming from, and that is not going to happen until more money is spent on trying to know exactly where it is coming from in terms of swabbing people. Obviously basic precautions are there, wash your hands, but you know that when someone is positive you are taking extra care. If you don't know, you don't know" (CH2)

(ii) Observer/Actor bias – "Outsider and insider views"

✤ **Staff tend to attribute origins of MRSA elsewhere (in other health care settings/public spaces)**

Given that staff may not always have access to information about a patient's MRSA status and that staff tend to rely on infection control information that is provided by their organisation, it is logical that both hospital and care home staff tend to attribute cause to environments other than the one they are working in.

"People do get it in hospital and do become very unwell but it's not a, I don't think it happens on a very regular basis" (H2)

"[FACILITATOR] So if people don't get MRSA here, where do you think most people get MRSA?
My opinion, different hospitals and sometimes in public place, but not exactly, street and buses…maybe swimming pools?" (CH3)

Staff in both hospital and care home settings are likely to make judgements about the causes of specific cases of MRSA on the basis of their own experiences and practices. For example, staff believed that their adherence to good infection control practices meant that cases of MRSA could not be attributed to their care setting.

"We know that when we care for our residents, when we treat them the time of infection, like if someone has a wound, the time of healing is very fast. Those kind of things are evaluating us really… That means there is no infection, so that is how I feel about the units" (CH2)

An interesting dimension to the issue about cause was that staff tend to distinguish between attributions about the origins of MRSA (for example hospital settings or antibiotic usage) and attributions of causes of transmission – which was principally perceived as being attributable to poor infection control practices. Indeed, staff in both hospital and care home settings perceived MRSA to be a healthcare system-wide problem, irrespective of where the infection originated.

"Well you see it's an infectious thing, so to me it doesn't mean they are coming in from the hospital only. It can be from various places, nobody knows because it's infectious. And one needs to prevent it, and if that is not there then it's going to be on the loose and it doesn't necessarily mean it's from the hospital" (CH3)

✤ **Staff tend to associate cause of MRSA with organisational reputation and cleanliness**

Reputation for infection control was a key issue for staff. It provided one source of motivation to establish or uphold a good reputation for infection control when compared to other organisations. At the same time, established reputations about MRSA rates in particular care settings could serve to uphold false perceptions of risk, as illustrated by the following quote from a hospital-based nurse:

"I was always led to believe that if they [patients] came in from care homes they were much more likely to have it than if they came in from their own homes. But I don't know if statistically that's correct but that's what I was always led to believe" (H3)

"I think there are a lot of articles in the paper at the moment which are saying most of these nursing homes that patients come from are not clean, the standard is not clean, so when

the patients come from the nursing home and they come onto the wards and you know, they just come and they get screened and they've got it. So basically the patients on the care of the elderly wards are coming into the hospital with it" (H7)

Cleanliness of a care environment (including care home and hospital) was often perceived by staff to be an indicator of infection rate.

"There are a lot of nursing homes around and if you walk in you are greeted by the stench of urine and that couldn't be very hygienic. Based on that, I would think that there is quite a big difference" (CH1)

"Because hospitals, some of them, when they're cleaning the ward they clean round the bed, they don't clean underneath the bed, they don't move anything, you can see the dust on there. Use one mop, in, out, in, out, all the time" (CH5)

These views about the links between cleaning practices and infection control support the theory that outside observers are more likely to attribute causes to 'person' rather than 'situational' factors. In the example below the problem of controlling MRSA is attributed to staff working elsewhere failing to protect patients.

"It's an ongoing battle isn't? … It's trying to figure it out and get on top of it and then you get someone walk in from another hospital where they might not have protected them against it or not swabbed them and then you have, like, an outbreak and you've got to get back on top of it" (CH4)

Key associated issues are the lack of comparative information about infection rates and staff uncertainties about actual links between cleanliness and infection rate. The degree to which staff are aware that they may hold such biases is variable, that is, some people are certain of their beliefs about rates compared to other healthcare organisations (as illustrated by the first quotation below) and others are more aware of current uncertainties surrounding place of transmission:

"If we compare what we have here with what we see in hospital we can see that our rate is very low" (CH4)

"I don't think we are ever going to know what is going on until we have a policy of swabbing once people come into hospital and then swabbing once they come into the home to find out whether they are actually acquiring it from here or whether they are coming from hospital. So, for now it is going to be a ping-pong. It comes from the hospital, no it comes from the care home. Everyone is just passing the ball…The hospital blames us and we blame them" (CH2)

Taken together the implications of actor/observer bias in this context are that staff are likely to underestimate risk in relation to their own care environment and there is potential for false perception of MRSA rates elsewhere based on service reputation and cleanliness.

(iii) Situation/Disposition bias – "Assigning responsibility"

Judgements about cause can involve assigning responsibility, success and sometimes blame. According to attribution theory when avoiding blame people are more likely to attribute cause to 'situational' factors, and when claiming successes people are more likely to attribute cause to 'person' factors, including their own actions.

Findings from the staff questionnaire show that staff tend to associate cause within healthcare settings to staff not washing their hands.

✦ **Internal (personal) attributions of cause associated with times and places of close inter-personal contact (care giving, washing, feeding, invasive procedures)**

Staff were well aware of the possibility that they may be MRSA positive or carry MRSA between patients. This is reflected in the individual estimate exercise which found that both hospital and care home staff perceive handwashing to be the main factor in preventing the spread of MRSA in healthcare settings. Interestingly the use of gloves was seen as both a positive and negative contributing factor to transmission of infection (discussed later in relation to personal safety).

> *"I've seen some of the staff here not wash their hands, go from one to another Yeah but it is education isn't it" (CH4)*

> *"We all try our best but at the end of the day we're only human" (H5)*

These issues about personal attributions of cause are related to the information biases discussed in the previous section; including uncertainty about personal MRSA status (some staff have experience of screening others don't) and uncertainty about modes of transmission.

> *"To some extent yes, when the cases of MRSA spreading, right, we might not tend to know, how it's spreading" (CH4)*

✦ **Internal (team) attributions of cause include: 'lapses' in infection control practices and resource issues**

Staff within both hospital and care home settings raised the issue of 'lapses' in infection control. In the hospital setting these were attributed to time pressures, understaffing and the competing priorities of clinical care.

> *"When it is just you and you have maybe 13 patients to look after there's not that much space between you handling the MRSA patients and going to the other patients. So no matter how hard you try, sometimes its cross infection, the risks will be there" (H1)*

In both settings there was some debate about whether lapses in infection control were attributable to such practical difficulties or laziness. Some staff perceived lapses to be inevitable.

> *"If you put your staff under more pressure to have all this done with the same amount of time to do it in then of course you're going to forget stuff. It's just human nature… In an emergency situation, we don't have the time, you can't be doing it, it's impossible to be*

doing that all the time and then you feel dead guilty because you've not been doing all the things you should be doing and something's got to give, and sometimes unfortunately it's the simple stuff like universal precautions" (H5)

In the care home setting staff felt lapses were acceptable if the risk of infection was low for a particular patient or the type of care they were being given.

"I think we all do it [lapse on handwashing], we all do it, we're humans, we think oh no it's just, but then you've got to step on yourself.
I don't!
You're not human then.
It's where it's reasonable, practical, you've got to do it. What I'm saying is you've some people who will take their gloves off and then go straight back to that person after coming out the room.
…with a lot of people it's laziness. It is laziness. 'Oh I can't, oh she's got nothing , I won't bother for the minute" (CH4)

Two care home staff groups discussed the financial costs of routine client swabbing and staff screening for MRSA.

✧ **External (healthcare) attributions of cause include: policies and management**

Staff associate the cause of MRSA with a lack of basic standards for infection control management across different healthcare settings.

"There are no standard policies that you go by. In some areas they say you have to isolate [clients who have MRSA], in some areas they say it's ok as long as you haven't got an open wound or a catheter or something like that ..There is still work to be done and some of it may just be policy makers or the powers that may say this is what we need to do to get a handle of it" (CH2)

Some staff in the care home setting had previous experience of working elsewhere and drew on these experiences to formulate opinions about infection control practices across different organisations (Examples are provided in the section entitled External attributions: care practices in other care settings).

In both the hospital and care home settings staff explained the importance of strong management, monitoring and documentation of infection control information to support staff giving direct patient care.

"I think it comes down to strong ward management and strong infection control practices. That the ward management and the hospital then deliver down to the junior staff and it has to go down all the way...You have to involve your care workers, your domestics, your dinner ladies that come round and give out the menus" (H1)

✧ **External (patient) attributions of cause associated with individual (age, poor general health status, previous positive screen for MRSA)**

Staff associate the risks of MRSA with:
- patients with previous or current positive MRSA status
- individual patient characteristics (age, poor general health status, previous positive screen for MRSA) and a person's ability to care for themselves
- invasive procedures and treatment

- times and places of close inter-personal contact (care giving, washing, feeding)

And, greatest risk was attributed to the interaction of multiple patient risk factors:

"A person who is old, bed sores, compromised, with illnesses, coming from hospital, surgery, they have terrible risk. There are too many variables that you are going to be dealing with" (CH2)

Staff perceived risk of MRSA transmission to be associated with a concentration of high risk patients in any particular setting:

"I suppose it's where you've got lots of people together in the same room sharing care and equipment, it's more easily going to jump from one to another" (H2)

And also to high risk patients staying in high risk infection environments:

"The longer you stay in a place like this the more chances you have of picking up, well, any hospital acquired infection" (H4)

The potential effects of this finding are that staff could overlook the risks of caring for patients with unknown MRSA status. An exception to this finding was expressed by a few members of staff who argued that perceiving MRSA as something that happens to older patients could lead to an underestimation of the risk of infection for other groups of people.

"From my own experience it doesn't depend on your age or where you live, or what happens, anybody can have it, because I myself was, and I'm only 22, and I know many people who are young who do have it as well … anybody is at risk of developing a serious infection" (H1)

⌑ **External (patient) attribution of cause associated with patient movement between care settings/ transportation**

Staff in both care home and hospital settings tended to attribute cases of MRSA on their unit to patients who already have MRSA being admitted to their unit.

"On my ward, for MRSA, it is extremely rare and when I do, it is usually because there has been a bed crisis in the hospital and we have had to take patients in from A&E" (H1)

Patient movement between care settings was thus seen as a cause of infection spread. Transportation staff (ambulance and care buses) were perceived to be part of the problem of infection spread.

"When the residents go on the buses, do you actually see the drivers, the people who get the residents on and off the buses with Alco gel, washing their hands before and after? I know the ambulance crew do, but the actual ones that do the transport, they don't have anything like that… no where to wash their hands or anything, and they are just passing on to each of them that they are going to" (CH4)

Staff use of public transport was perceived as a further place for infection spread:

"If you think we are all taking public transport to get to work, obviously we are not wearing the same clothes, but still, we're coming from public transport and then coming into hospital" (H3)

✦ **External (visitors) attributions associated with relative's poor infection control**

Staff working in both settings felt that the organisations they were working in made information and infection control facilities available to visitors but that these were often not used or understood. As the extracts below illustrate, it can be difficult for staff to convey information about infection control and if visitors do not notice or take-in information provided to them, particularly if they have low levels of literacy or if English is not their first language.

"We do as much as we can, but it's just whether they choose to listen. We've got a notice 'please wash your hands' for visitors, some of these people can't read and you're not gonna know" (CH4).

"Ninety-nine percent of the visitors you have on your ward do not wash their hands or do not use the gel or anything. So you can't really say that we're giving it. The MRSA in the community, everybody needs to be educated about it" (H2)

Visitors to care of the elderly wards or to patients known to be MRSA positive were generally perceived to be better at using infection control and this was because of staff telling visitors about the patient's positive status and providing instructions about infection control.

"I think we aid visitors to do more infection control when we know that the person they are visiting is already infected and is in a room and already has MRSA" (H4)

✦ **External (care practices in other care settings) attributions include: poor staff knowledge or laziness, resource shortages**

Causal factors to do with comparative organisational settings were less readily discussed by staff in both settings. Some care home staff, who had experience of working in another care home did express views about other organisations when probed about 'their views of what happens here compared to elsewhere'. Some staff reinforced that their infection control practices were good by citing negative examples of practices elsewhere. These included perceptions of poor staff knowledge of infection or laziness in infection control practices and resourcing.

"Although the minimum standard would be standard precautions, in terms of going beyond that and staff actually adhering to that, can be quite different in various homes" (CH2)

"I worked somewhere else, and the way they do things is different to how we do things" (CH3)

"As we are going in there [another care home] the nurse said 'this is the just the hand gloves we have for today – we don't want you to change any hand gloves this is just what we have, just use this" (CH6)

✦ **External (social) attributions of cause associated with antibiotic usage**

To some degree MRSA, and healthcare associated infection more widely, was perceived as an inevitable social problem associated with antibiotic usage. Some staff were critical of past antibiotic prescribing practices in primary care and patients wanting to be prescribed antibiotics.

"You go to the GPs and they used to just prescribe, they don't any more…. you've got the common cold, they used to just prescribe amoxicillin, they're not anymore" (H4)

Related issues were staff uncertainty about the regulation of antibiotic usage for human and agricultural uses.

"The foods we eat as well, the meat, factory chicken is pumped full of antibiotics, your cows are pumped with antibiotics and other growth hormones, that's surely not going to help with the general fight against things in the long term" (H5)

✧ **External (public spaces) attributions of cause associated with places of close public contact e.g. buses and waiting rooms**

Even though staff placed a strong emphasis on cause according to patient risk factors and movement through health systems they did not overlook issues about transmission in non-healthcare environments.

"I think public places, and the hospital is one of them. Wherever two or three people are gathered" (H3)

Staff highlighted related issues about social responsibilities for infection control, for example making suggestions for better education in schools and public health campaigns about infection.

"I think they should go into schools and everywhere. Especially primary school kids because you could have your granddad in a home, and you could be washing your hands and everything there, they could be transferring it by touching the kids, taking it back there in the schools … they should be taught as well" (CH4).

In relation to infection control two overall implications can be drawn about situational/dispositional biases. Firstly, that the focus on human causes of transmission could mean staff do not identify or seek to overcome potential weaknesses in systems, procedures or resourcing that contribute to the problem of MRSA.

Secondly the focus on external causes (patient, visitors, other care settings, public spaces) could mean that staff perceive risk and responsibility to be greater elsewhere. Indeed, when we asked staff whether they thought MRSA a serious threat, although the majority thought it was (see section 3.2), their responses tended to reflect their view that it was a risk to individual patients that could be addressed with medical help.

"Not to society, I won't say serious, because I think medication, we've got medication and it can cure" (CH3)

(iv) Normative bias – "Group think"

According to attribution theory, group and social processes define what is normal and acceptable. Findings from the focus groups show that staff within teams display normative bias in relation to the expectations that team members will adhere to locally agreed infection control policies and practices.

✦ **Staff within teams generally say their infection control behaviours are consistent with infection control policies and practices.**

Within the focus groups staff did not express significant differences between what they and colleagues within their care team do. For example, staff participating in the focus groups as part of a team tended to say that their adherence to local infection control policies and practices is good (though this was expressed as 'good teamwork').

"I just think it's good teamwork isn't it, I mean if the cleaners didn't work with the carers and the carers didn't work with the cleaners and laundry and whatever…" (CH4)

Staff, particularly in the hospital setting, felt they were practicing sufficiently good infection control within the hospital and that some infection control issues were beyond their control.

"In here we can do quite a bit. We make sure that we protect ourselves, that we protect our patients, we use all the aids that we've got for handwashing and all the other gimmicks we have to stop it being passed on" (H5)

It appears that a strong and shared view of good infection control practice (whether or not actual rates are known) supports team collegiality and builds esteem.

"I think all of the staff here are very aware, and as I said we all follow the correct protocols, we all do our very best. And I for one am very proud that we've done so well and I wouldn't want to do anything to jeopardise that." (H8)

At the same time teams were aware of difference between team beliefs and practices because of previous work experiences in other departments or organisations, which could in some cases lead to habitual poor practice.

"But habit is habit, if their habit is that [poor infection control] then it continues. I'm just saying, the way we do things here and the way they do things…" (CH3)

Within mixed team groups (where staff were working across different units) there was evidence of unit-level variation in infection control practices. This was generally recognised by participants as a necessary and acceptable element of caring for different groups of patients.

✦ **Staff may monitor and encourage each other to adhere to good practice.**

Staff working closely together monitor and encourage each other to fulfil infection control practices.

"Before we have had high [number of MRSA] cases, and we've seen them reduce, we just keep on top of It. Even down to the cleaners, every one in the building knows if a resident's got it, so we're all informed and it's protocol isn't it?" (CH4)

A related issue that staff raised was that the infection control behaviours of care providers who work across teams (e.g. doctors or carers) may differ from team infection control behaviours.

"I think doctors tend to think that they don't have to follow rules I think sometimes. And I, well I think I'm probably a bit out-spoken sometimes, but I do, if I see them, I would say to them" (H8)

"Or the carers that come in if you are in your own home and you get home carers, they could be going out to someone that's got it, for whatever reason" (H4)

In both the hospital and care home setting staff teams felt it was important to always uphold standards by challenging poor practice.

"Our domestics shouldn't be afraid to say to one of the doctors, oh excuse me you haven't washed your hands" (H7)

Some staff, working across teams e.g. Link nurses and members of Infection Control Team or nurses working in more than one care home felt it was important that they advise teams on what is best practice for the contexts and patients they are working with. In these cases these 'advisors' had developed inter-organisational awareness of what is acceptable and normal, which could differ from locally accepted norms.

"Well, yes, you teach them, so when they see us coming, they just start to move different, I said to them you know, in here, you must be the best carer. Don't watch what people do, you do what you know you're supposed to do" (CH3)

"The infection control link nurse, before we used to every week do the audit. Well basically go to the ward check on hand washing, everyone like doctors, everybody involved in patient care, and also urine catheterisation and canula, so we check on a weekly basis and get all the results here, for each ward to compare whether they improve" (H1)

✦ **Education and induction of students and agency staff to local infection control policies and practices**

Further evidence for normative biases was the view that staff new to the particular care environment needed to be educated to understand local infection control policies and practices.

"I suppose we are a university hospital so we have students coming here who may or may not be aware of our practices and may not be up to date, or as up to date with current infection control issues as perhaps the qualified staff so it's about educating them as well. Wherever you've got a novice you've got an increased risk of things like that slipping at some point" (H2)

As illustrated by the following quote, staff were concerned that short-term agency staff worked to the same standards and ongoing infection control goals as other team members.

"What if today I don't show up for work then you have to get an agency, this person, they might be aware but they might forget about it, that this person has MRSA, and then they go into person's room, forgetting to do all the things that you're supposed to do" (CH6)

(v) Motivational biases – "End goals"

According to attribution theory people's actions are motivated by end goals – what they aspire to achieve.

✧ **Personal safety**

A small number of staff in both care home and hospital settings raised concerns about personal safety and saw this as an important reason for being informed about a person's MRSA status and using protective equipment, as illustrated by the following quote from a healthcare assistant.

"I went to one care home, last year for a shift and there was a man had it there and nobody told me. And when I came home, on my hands you could even see it. But you have to be careful, but nobody told me. If anyone comes into work and they have it, you be careful of that person, wear protective clothing. But nobody told me he had it and I gave him a shower, and it was on my hands" (CH3)

However, for other staff the issue of personal safety was not straightforward. Some staff suggested that staff fears about personal safety could be linked to lack of staff confidence and lead to poor infection control practices.

"You do get individuals that haven't got the confidence and they wear gloves everywhere they go. You are going to get that anyway because they won't ask but they just make sure that they're going to protect themselves" (H6)

✧ **Fear of blame or stigma that is associated with poor personal practice, infection rates, patient suffering and infection outbreak**

To some degree this research revealed the demoralizing impact of blame and stigma that is associated with poor personal practice, infection rates, patient suffering and infection outbreak.

"Blame is a horrible and not very nice word and I don't think it helps. But I think we are getting better" (H2)

"But we look at the statistics and we say oh this month we've got this one case of MRSA bacteraemia or we've got this… I can't help but feel that's a bit of a go at the staff, and quite rightly, that's probably what's caused this problem, but I sometimes just feel that we don't get enough appreciation for perhaps the nature of this work" (H4)

"If something happens in the hospital, maybe something happened and it wasn't good, we're all feeling disappointed. If [names member of staff] came in and she said to us oh your ward's not very clean today or whatever, I'm disappointed, I think oh golly, because we don't want to let people down, we want our hospital to do well" (H7)

The focus groups also revealed that staff were generally very aware of the fact that patients can also suffer stigma because of MRSA.

"We had one lady a few months back she said my home is very clean I'm not a filthy person I don't have any pets so how could I get this? And she was very upset. To her she associates the MRSA with filth in the hospitals and she hadn't been in hospital for a while so she couldn't understand how she could have possibly got that"(H1)

In the hospital setting some nurses reported tensions associated with explaining to family members that a patient has MRSA. These nurses felt that relatives perceive MRSA to be attributable to poor quality nursing care.

"Sometimes we find families can be very confrontational and we actually get infection control to come and assist us in explaining because they feel safer speaking to someone who is not a nurse because sometimes there is a trust issue with the nurses" (H1)

In some of the care home settings there was evidence of staff distancing themselves from potential blame by choosing to work in organisations with good infection control policies and practices in place.

✦ **Fear of 'bad press' from the media/public opinion**

Staff also described fear of 'bad press' from the media/public opinion.

"I think this hospital does a great job and I don't think they get enough credit for that, because you know, if you read your local paper you only hear people say bad things, but actually I believe that the rate is very, very low in this hospital, probably one of the lowest in the country and that's due to a lot of hard work by all of us. And I know that we are all very aware of MRSA here and do our best, and I'm sure that if anyone in the hospital has it, I'm sure they didn't catch it here" (H8)

Staff in the hospital setting tended to positively cite improvements in organisational infection rates as evidence that infection control practices had improved.

"Massively improved [rates] recently. I think they were high a few years ago, we have a bit of a history around that. But I think they have definitely improved now, after a lot of hard work from our infection control team" (H2)

"If we were doing better than other hospitals we'd certainly make sure that we… got that information out into the community" (H6)

An implication is that staff who perceive themselves to be performing well may feel demoralized, undervalued or seek to distance themselves/their team from other 'failing' parts of the organisation or health system.

✦ **Willingness to behave in accordance with clear organisational policies e.g. bare below the elbows**

At the same time staff expressed their willingness to behave in accordance with clear organisational policies, for example bare below the elbows policy, uniform policy and protocols for the use of hand gels.

"We are not supposed to use our uniform outside which is a good thing… because of infection and things, which is really good
[FACILITATOR] You're very supportive of that, people don't complain about that?
They did at first, but at the end of the day that's the rule and if you don't like it, you have to work somewhere else, that's it, because it's for a reason, and when you've explained to people what the reason is, then generally they understand and then they do it" (H8)

✦ **Encouragement from Infection Control Team, clinical facilitators and managers**

Staff were also positive about the encouragement provided to them by colleagues, for example the Infection Control Team, Clinical Facilitators and Clinical Managers. Motivation to improve infection rates and practice was linked to tangible improvements in policy and practice over time.

"There will always be gaps in whatever knowledge you are talking about because there are always new innovations that you can't always be 100% on top of. It helps that we have a very strong infection control team that is very pro-active and does let the staff know about new measures that are coming into force" (H1)

An important associated factor was the accessibility and communication of infection control information through organisations, including having continuous reminders about the importance of infection control.

"You go onto a ward and the first thing you see is the handwashing poster and that will automatically jump you to think oh I must wash my hands after I've done this or when you leave the ward to do the gel … you could tailor it to a particular ward, if you have like a care of the elderly ward, there are certain practices you need to make sure in order to prevent infection" (H6)

Some staff said that they appreciated the support and reminders offered by clinical facilitators, which also encouraged them to remind colleagues about infection control issues, as illustrated by the following extract:

"The only improvement on what the infection control team does I would say is it needs to be on the wards more frequently as well as the main updates…to give people a bit of a kick up the backside to remind them, and then if you just keep, keep, keep at them, it'll go from being something you have to think about to something that's automatic" (H5)

An important potential effect is that although staff may be willing and motivated to practice good infection control there can be barriers including staffing pressures, resources and ward layouts which may not be given adequate attention. There can also be uncertainties about best practice, including times of critical handwashing, infection risk from uniforms and the best way of delivering patient information. If staff who perceive themselves to be performing well distance themselves or their team from other 'failing' parts of the organisation or health system the impact may be further demoralization for staff and lead to increased MRSA risk for patients.

3.4 Interaction effects

An overall issue that the data reveals is that *biases interact*. Some of the most readily identifiable interactions are explained here.

Information and ownership

The combined influence of information and normative biases mean that misperceptions about MRSA rates can be maintained at individual, team and organisational levels. For example, individual staff are likely to underestimate the likelihood of MRSA transmission within the setting where they are working because in the absence of concrete information about MRSA rates staff teams tend to believe they are doing well on the basis of adherence to infection control practices defined at a unit-level.

> *"We are nurses, we try our best, washing our hands, putting on our aprons, gloves and everything, we try everything. Through the infection control nurses, most of them go from ward to ward, trying to supervise, anything we are not doing right trying to put us right. So we try to follow all of that. So I think it's coming from the community, we are trying our best" (H2)*

The fact that individual staff members are unlikely to actively seek objective benchmarks for MRSA acquisition rates or to compare infection control policies between different service-units reinforces a reliance on organisationally provided information. In a few isolated cases staff said that their views about organisational performance on infection control were informed by discussions with staff working elsewhere.

> *"Well sometimes managers talk with each other, in different homes and things. And they can mention they've got this, not epidemic, but high risk, a high percentage of MRSA. And then she will probably start to talk about hers and then that's where we can find out. And you can ask colleagues working elsewhere and ask them" (CH5)*

> *"I've got friends who work in other hospitals, and we do discuss, not just rates of infection, but other things... Even if it's just having a minor conversation, talking about or moaning about what's happening in yours and their moaning about what's happening in theirs, and then you get chatting about different things. And not that everyone's an expert, hearing about the infection control rates talking to the infection control team, but you get the gist of how many people on the ward that week got MRSA" (H5)*

Staff in both settings perceived advantages to having more opportunities and encouragement to compare organisational MRSA rates and infection control practices.

> *"[FACILITATOR] But I'm interested to know if you think it would be useful to know how you compare with other care homes? In terms of the MRSA, whether rates are low or high here.*
> *Yes, it would be very helpful.*
> *Yeah we'd like to know.*
> *[FACILITATOR] Why do you think that would be useful?*
> *Well if another care home had, if we had a lot of MRSA and another care home had a lot less then you'd ask*
> *Yeah, what are they doing right that we're not doing, so you can learn from somebody else" (CH5)*

The extract below illustrates the complex interaction between information (evidence/observation/awareness), attribution of cause (experiences of infection spread within the home), and positive outcomes attributed to the team ("we controlled it", "we are very aware", "we handled that wound in a really professional way").

"Really everybody is aware about infection control here. We are really, the staff are very careful. So the way they handle it is really with care... I can't see any new wounds developed in the home, in most cases. That means the way we care is very according to the infection control policy" (CH2)

Situation/disposition and perceptions of risk

Situation/disposition biases are closely related to notions of where risk is coming from and where responsibility lies. Staff tend to attribute the causes of MRSA to external (not self) human factors including patient risk factors and poor infection control practices of others.

"When they go into the hospital they are usually really quite sick so… they're at a high risk of catching it from hospital because that's when they are sick.
Yeah, the environment they're going into is bigger, there's more traffic" (CH4)

Staff are generally very aware that MRSA risk is associated with patient factors (such as age, health status, previous history of MRSA) and recognise the importance of infection control risk, however staff were also clear that MRSA could be a risk for any person and there was a danger of simply attributing risk to certain age groups, treatment interventions or care settings.

"There are too many variables. You are going to say this age group, in this setting, and they will technicalize it and say who is the most vulnerable" (CH2)

On this basis, teams explained that their responsibility was to maintain their infection control training, to support each other through role modelling and to observe infection control successes at an individual patient level, for example by monitoring wound healing.

"A lot of our patients…are already aged and have illnesses and they are already immuno compromised, but when you get a wound that heals, then you have got to say that you are caring is very very good. If that person is already with age, immuno compromised, with dementia, and all those kinds of things, then you have to salute that if their wound is healing then we are doing something right" (CH2)

Motivation and information about cause

Staff in both hospital and care home settings explained that organisation-wide performance on infection control is important to them. Staff in the hospital setting in particular felt there was a need to convey positive messages about organisational infection rates and standards to the local public. These strong motivational biases could mean that staff teams tend to attribute group successes to dispositional attributions (good team infection control policy and performance) and attribute failures in team infection control to situational attributions (client group, patient movement through systems of care, work pressures).

"Sometimes the infection control guidelines can't be followed because of patient safety or because of staff numbers and I'm sure this happens, you know it happens everywhere... I know from personal experience, you know, I can be doing something with one patient, I know I've got to take my gloves off, wash my hands, get myself kitted out to go to the next patient but when you can't do it, you can't do it. You go in there with your dirty gloves and your dirty apron because you're stopping someone from …
Extubating themselves.
… or they've pulled their arterial line out, now, of course you have to do that, that's your course of action for patient safety, but then when you hear next time, oh there's your case of MRSA bacteraemia, you know it's quite hard" (H4)

"We're all for the patients at the end of day, we know we're saying we're the best light heartedly, but we are proud of our Trust, I am, but you can learn from other people and you should because at the end of the day, it's for the patients, whatever hospital they're in, isn't it?" (H8)

The motivation to be seen to be doing well and team dynamics could work to quash suggestions for improved infection control. In one care home staff were talking about infection control in the home. When one member of staff suggested these could be improved staff were quick to question this remark, particularly as the conversation was being recorded. When it was explained as a resourcing issue (a situational factor rather than a dispositional factor), other members of the group were more accepting of the possibility for improvement.

"It [infection control practices] could be a bit better.
In what way?
I was just going to ask that question.
Well, is this tape on?
[Laughter]
Yes. And a shut door, you're ok.
Explain yourself, go on.
No, it's good, it's good.
No, come on.
Ok, for starters our bedpan washer could be…
Oh, we need a new one of them.
We have to look at all of that really. The bedpan washer one thing, better bedpans.
More bedpans.
Yes, you're saying it's on the equipment as opposed to … [staff poor infection control]
Oh yes.
New bedpans, a new bedpan washer.
Throw out some of the urinals.
Yeah can get some new ones of them" (CH5)

On the other hand team members tend to attribute outsider group failures in infection control to poor infection control knowledge or laziness rather than to a lack of infection control information or resources. The combined influence of motivation bias and situation/disposition bias can thus contribute to building esteem or responsibility at an individual level, amongst teams or in relation to the wider responsibilities of the healthcare providers.

"It's an infectious thing so no matter how the healthcare settings try to prevent it, it's still infectious so anything can happen … I'm sure the healthcare settings are doing their best to sort it and get some kind of information across to prevent it" (CH3)

The following table (Table 13) draws together key findings, related issues and possible effects of the attribution biases studied here.

Table 13: Summary of staff focus group data

Attribution theory	Evidence of theorised bias	Related factors and issues	Potential effects
(i) Actor Information bias *The kinds of information and decisions that people use to determine cause*	• Staff say their views about MRSA are 'informed', however, the consistency of information use is uncertain and individuals cite many different types of evidence • Staff say that staff and public awareness of MRSA has improved • Staff say they access education and training but this can be variable in content and focus • Differences in availability of information about patient MRSA status (in particular routine screening) in own and other care settings	• Staff award value to infection control information that is directly relevant to their own practice/ organisation • Communication of information to patients • Where patients are known to have a positive MRSA status staff say they are more cautious	• Variation in quality of infection control practices because of differences in how staff perceive and use information • Leadership support to help staff recognise their own training and education needs • Difficulties for uninformed staff to address patients concerns about MRSA
(ii) Observer/actor bias *A person's situated position in relation to an issue*	• Staff tend to attribute origins of MRSA elsewhere (in other health care settings/public spaces) • Staff tend to associate cause of MRSA with organisational reputation and cleanliness	• Lack of comparative information about infection rates • Actual links between cleanliness and infection rate	• Staff likely to underestimate risk in relation to their own care environment • Potential for false perception of MRSA rate (elsewhere) based on service reputation and cleanliness
(iii) Situation/ disposition biases *Internal and external attributions of cause*	• Internal (personal) attributions of cause associated with times and places of close inter-personal contact (care giving, washing, feeding, invasive procedures) • Internal (team) attributions of cause include: 'lapses' in infection control and resource issues	• Uncertainty of personal MRSA status (some staff have experience of screening) • Uncertainty about 'personal' modes of MRSA transmission e.g. touching surfaces/critical times for handwashing	• Focus on human causes of transmission could overlook potential weaknesses in systems, procedures and resourcing.

Table 13: continued

Attribution theory	Evidence of theorised bias	Related factors and issues	Potential effects
(iii) Situation/ disposition biases	• External (patient) attributions of cause associated with individual (age, poor general health status, previous positive screen for MRSA) • External (patient) attribution of cause associated with patient movement between care settings/ transportation • External (visitors) attributions associated with relative's poor infection control • External (IC in other care settings) attributions include: poor staff knowledge or laziness, resource shortages • External (healthcare) attributions of cause include: policies and management • External (social) attributions of cause associated with antibiotic usage • External (public spaces) attributions of cause associated with places of close public contact e.g. buses and waiting rooms	• Uncertainty of IC practices in other care settings • Regulation of antibiotic usage • Social responsibilities for infection control e.g. information in schools, public health campaigns	• Focus on external causes (patient, visitors, other care settings, public spaces) could mean staff perceive risk and responsibility to be greater elsewhere

Table 13: continued

Attribution theory	Evidence of theorised bias	Related factors and issues	Potential effects
(iv) Normative bias *The effects of group processes and thinking*	• Staff within teams generally say their infection control behaviours are consistent with infection control policies and practices • Staff may monitor and encourage each other to adhere to good practice • Education and induction of students and agency staff to local infection control policies and practices	• The infection control behaviours of care providers who work across teams (e.g. doctors/carers) may differ from team infection control behaviours • Some staff work across teams to advise on best practice e.g. Link nurses and members of Infection Control Team	• A shared view of good practice can support team collegiality and confidence to contest poor practice
(v) Motivational bias *The kinds of motives which influence behaviour*	• Personal safety • Fear of blame or stigma that is associated with poor personal practice, infection rates, patient suffering and infection outbreak. • Fear of 'bad press' from the media/public opinion • Willingness to behave in accordance with clear organisational policies e.g. bare below the elbows • Encouragement from Infection Control Team, clinical facilitators and managers	• Tangible improvements in policy and practice over time • Access to training and information • Barriers: staffing pressures, resources, ward lay out • Uncertainties about risk e.g. wearing uniforms outside of service setting	• Staff who perceive themselves to be performing well may distance themselves/their team from other 'failing' parts of the organisation or health system • The cognitive impact of blame and uncertainty may be demoralizing for staff • Staff may be willing and motivated to practice good infection control but there are barriers and uncertainties about best practice

3.5 Potential effects

Looking across the staff focus group data as a whole, the evidence of attribution biases here point towards three potential effects for infection control practices across the hospital/care home interface. These are as follows:

(i) Information needs

We found evidence of variable availability and access to information. Hospital staff clearly had better access to information on actual MRSA status compared to care home staff. Despite this, the estimation of prevalence in the over 75 client group among the over 75 client group provided by hospital staff seemed to have little grounding in reality whereas that of care home staff did. It may be that hospital staff experienced more difficulty with the estimation task but if this is the case it is not explained by a lower availability of information. While this needs further exploration it suggests that estimated risk is influenced by factors other than availability of information.

Differences in the kinds of information health care staff use to determine causality of MRSA mean that there is strong possibility for variation in the quality of infection control practices between organisations. Staff tend to award value to infection control information that is directly relevant to their own practice or the organisation they are working within. This could indicate a need for more consistent leadership and support at an organisational level to help staff recognise their training and education needs in relation to their own specific work contexts. The widespread availability of information on overall rates in hospitals may not provide the kind of information that staff are able to use and apply to their specific setting within the hospital. Furthermore, some staff say it is difficult to address patients concerns about MRSA, to make better use of patient information notices or sheets, and to provide information for patients and visitors with low literacy levels or if English is not their first language.

(ii) Lack of ownership

Staff are likely to underestimate the relative risk of MRSA transmission in relation to their own care environment which could lead to false perception of 'high' MRSA rate elsewhere based on local service reputation and cleanliness. Staff tendency to focus on human causes of transmission could mean insufficient attention is paid to potential weaknesses in systems, procedures and resourcing. As staff tend to focus on external causes (patient, visitors, other care settings, public spaces) this could mean they perceive prevalence, risk and sources of MRSA to be greater elsewhere.

(iii) Quality differences

Group processes and in particular a shared view of good practice can support team collegiality and confidence to contest poor practice. However staff who perceive themselves to be performing well may seek to distance themselves or their team from other 'failing' parts of the organisation or health system. The cognitive impact of blame and uncertainty can be demoralizing for staff even though their infection control may be good. Although staff may be willing and motivated to practice good infection control there are barriers and uncertainties about best practice which can contribute to

'lapses' in best practice. All of these factors could lead to significant variations in the quality of infection control practices between teams and organisations.

Section 4: Conclusions & Implications

In this study hospital and care home staff have provided us with insights into their behaviours including the types of information and ambiguities that effect their every-day practice, the roles and positions staff hold in relation to infection control issues, the complexities of assigning cause and risk, how teams decided what is normal and acceptable, and the types of motives, end-goals and consequences that influence staff behaviours.

We found evidence of attribution biases whereby staff tend to attribute their own potential contribution to MRSA transmission to 'lapses' which result from specific factors in the work environment. However, rather than leading to a focus on the local work environment, the contribution of other individuals was more readily ascribed to individual lack of care or competence. Furthermore, there appeared to be a bias operating at the collective level in so far as causes of MRSA were located outside participants work environment. Both care home and hospital staff perceived their own organisation as posing less of a risk for acquiring MRSA than comparable environments. Hospital staff identified community settings including care homes as the predominant source of MRSA while care home staff identified hospitals as the main source. We found evidence of variable availability and access to information between the settings which was also associated with attribution biases.

4.1 Conclusions

In relation to the aims of the study, three general findings about attribution biases help to explain staff behaviours:

1. Staff use a wide range of types of information to determine causality of MRSA within their own organisations and in relation to the hospital/care home interface. However, consistent organisational and inter-organisational information about prevalence is lacking, which could explain why staff tend to estimate risk in relation to their own care environment as being low. We found evidence of variable availability and access to information between the settings. Hospital staff clearly had better access to information on actual MRSA status compared to care home staff. Despite this, the estimation of prevalence in the over 75 client group among the over 75 client group provided by hospital staff seemed to have little grounding in reality whereas that of care home staff did. It may be that hospital staff experienced more difficulty with the estimation task but if this is the case it is not explained by a lower availability of information. While this needs further exploration it suggests that estimated risk is influenced by factors other than simple availability of information. Potential implications include the need for better staff and patient information and more consistent leadership and support to help staff recognise their infection control training and education needs (Section 3.5).

2. Staff tend to attribute the causes of MRSA to external (not self or own team) human factors including patient risk factors and poor infection control practices of others. Staff less readily accept the possibility of transmission within their own care settings, and attribute this to situational factors (high-volume of high risk patients, time pressures/understaffing, and lack of resources). Potential effects are a lack of ownership as prevalence, risk and sources of MRSA are perceived as being greater elsewhere (Section 3.5).

3. The 'rules' staff use for going from information to inferred cause include:

- *Staff make use of what they know.* Staff tend to draw information about infection risk from past experiences of known cases of MRSA, for example where patients were admitted from and their personal characteristics (age, health care status, invasive treatment/open wounds).

- *Staff want to do well.* They say they know they are doing well when they follow locally defined infection control practices. Staff attribute failures in team infection control to 'lapses' brought about by situational factors (client group, patient movement through systems of care, work pressures).

- *Staff want their efforts to be acknowledged.* Staff teams tend to attribute group successes to dispositional attributions (good team infection control policy and performance). The desire to be seen to be making an effort and achieving improvements are perceived as being important for gaining public confidence.

- *Staff want to know staff elsewhere are making the same effort.* Staff tend to attribute outsider group failures in infection control to human factors (poor infection control knowledge or laziness) rather than to situational factors (such as lack of infection control information or resources).

In general terms the findings corroborate theorised attributional biases and confirm the significance of compounding factors in staff behaviours, including access to information, a persons situated position in relation to an issue, internal and external attributions of cause, group processes and motives. The propositions that we explored during the analysis (Box 1, Section 1.5) were evidenced across the data as a whole and there was much consistency between the views of hospital and care home staff despite working across this healthcare interface.

Of course these conclusions are generalisations and in reality individual staff members may disagree or hold opposing perceptions of cause, risk and responsibility; and importantly they may also practice infection control in different ways to different effect. Thus, at the same time as finding general trends in uncertainty and false perception, this research reveals a picture of variable staff perceptions of prevalence, risk and sources of MRSA brought about by differentials in information, ownership and quality of infection control practices at an organisational level. Some health care teams are clearly more informed about MRSA, have a greater sense of ownership over infection control issues, and develop systems are in place for assuring infection control practices.

In this research staff did not tend to describe issues from the patient's perspective, unless they had a close friend or relative who had an 'MRSA story'. However, staff did talk about risk to patients, and thus this apparent deficit may simply reflect the types of questions we asked.

4.2 Implications for research, policy and practice

This study has identified key attribution biases that influence staff behaviours in relation to infection control practices. Overall, there is potential to recast infection control policies and interventions to help staff understand and engage with their own information needs, ownership of the problem, and quality assurance. It is possible to identify some clear implications for policy, practice and future research.

(i) Current successes in controlling infections in hospitals may be vulnerable as attention focuses elsewhere.

Recent campaigns to control infections in hospitals have been hugely successful. As it is now recognised that the problem is not restricted to hospitals, as pools of colonisation exist in the community, attention will need to shift to other settings. However the attribution biases identified will need to be considered since they present a challenge to initiating effective action elsewhere. Focus on out of hospital sources of infection also raise the possibility that ownership of the problem by hospital staff may be undermined and lead to a diminution of effort and focus in that setting. As campaigns are developed the potential unintended effects in hospitals need to be considered and efforts made to mitigate this risk.

(ii) Further research is needed to find ways to examine and assess the 'everyday common-sense judgements' that staff make.

This study found that staff are not generally comfortable making estimates about their own behaviours or performance or those of others. And, that different people interpret and talk about risk in different ways, which makes any useful comparison between individual estimates difficult. Nevertheless it is important to find acceptable and accurate ways of understanding personal views about risk, prevalence and sources of infection between staff working in the same care settings so that infection control policies and practices can be further developed to work with rather than against these natural tendencies.

Negative motivational biases (for example some aspects of personal safety, fear of blame or stigma, 'bad press') can stand in the way of staff expressing their views about infection control practices and working towards developing understanding and approaches. To overcome any sensitivities around staff perceptions of infection control, researchers could attempt to engage with the positive motivational biases that staff express, including willingness to behave in accordance with clear organisational policies and gaining encouragement from specialist/expert colleagues. In this research we had the benefit of working with members of the hospital Infection Control Team in co-facilitation of the focus groups. This meant that staff in the hospital setting were more aware that their views may be heard and acted upon by infection control colleagues within the hospital. It was not possible to establish the same type of working relationships in the community setting with specialist support teams and thus, it proved important to work with managers to reassure staff that their views would not be used to test their individual or team's performance on infection control.

It may also be useful for researchers to key into the 'rules' that staff use for going from information to inferred cause. If researchers acknowledge that in general – *Staff make use of what they know, want to do well, want their efforts to be acknowledged and want to know staff elsewhere are making the same effort* – it may provide a safe starting point for examining issues with staff about healthcare associated infections.

(iii) Further research is needed to examine intrapersonal biases between staff and patients and their effects.

Interaction and professional relationships between colleagues have a strong controlling influence over determining what normal and acceptable infection rates and practices are.

These types of 'intrapersonal' biases are likely to inform and influence everyday interactions between patients and health care professionals however they are a poorly understood phenomena of healthcare team working. In particular little is known about the differing end-goals of professional/carer/client groups which can lead to inter-group conflict about infection control practices within organisations.

This study indicates that social categorization –most noticeably professional/non-professional status – influences the types of causal attributions that individuals make. Senior clinical staff tended to perceive infection control as an issue of professionalism requiring assessment and judgement on a patient/situation basis, whilst support staff tended to express confidence in their practice because of their consistent adherence to policies and guidelines for infection control.

(iv) To be more effective infection control policies should recognise issues about uncertainty and motivation.

A consequence of ambiguity and group norms can be a potential complacency as MRSA infection is seen as something caused by others which happens elsewhere. This research found false perceptions of other organisations and health care settings based on organisational reputation or cleanliness. Hence it is important that infection control policies and protocols recognise issues about uncertainty and motivation to help overcome differentials in information, ownership and quality of infection control practices.

A competitive attitude towards infection control is failing to inspire staff to flag-up and find solutions to inter-team and inter-sector problems of infection and could go against government policy initiatives to improve patient experiences at every point of contact with the whole health system. Hence, there is a need for policy initiatives to encourage and acknowledge efforts to overcome situational infection control problems, such as patient movement through health care systems, patient information and resourcing issues, as well as dispositional problems such as staff knowledge and infection control practice.

One notable area for development is that there are few incentives for staff to seek information about MRSA or infection control beyond the team they are part of. On the whole staff do not actively share good infection control practice unless it is a distinct part of their role to do so. Another issue is that there are few opportunities for staff to hear that colleagues working on the other side of a health care interface are making the same effort as they are – or to be acknowledged for their own efforts.

(v) Strategic infection control initiatives could encourage staff to work with colleagues and patients to tackle barriers to infection control by engaging with the natural tendency to attribute cause to human factors.

Attribution bias can mean that often attention is fixed on the human causes of infection, such as poor knowledge or hand hygiene, rather than including wider situational causes such as having better access to training or hand washing facilities. However, infection control initiatives could key into this natural tendency for staff to see infection as a human interaction problem that requires a human interaction response.

Tailoring infection control interventions to account for differentials in the types of information and motives different staff groups employ could help to achieve better understanding and engagement with local infection control policies.

(vi) Ward- and unit managers have a key role to play in linking between organisations and assuring that staff are aware of their performance and education needs.

Staff tend to rely on organisational information about infection rate and performance. This means that ward and unit managers have an important role to play in encouraging clinical teams to learn from teams elsewhere about infection control issues and best practice. One notable area is providing better visitor information (written and verbal) and client/patient-group specific instructions about infection control.
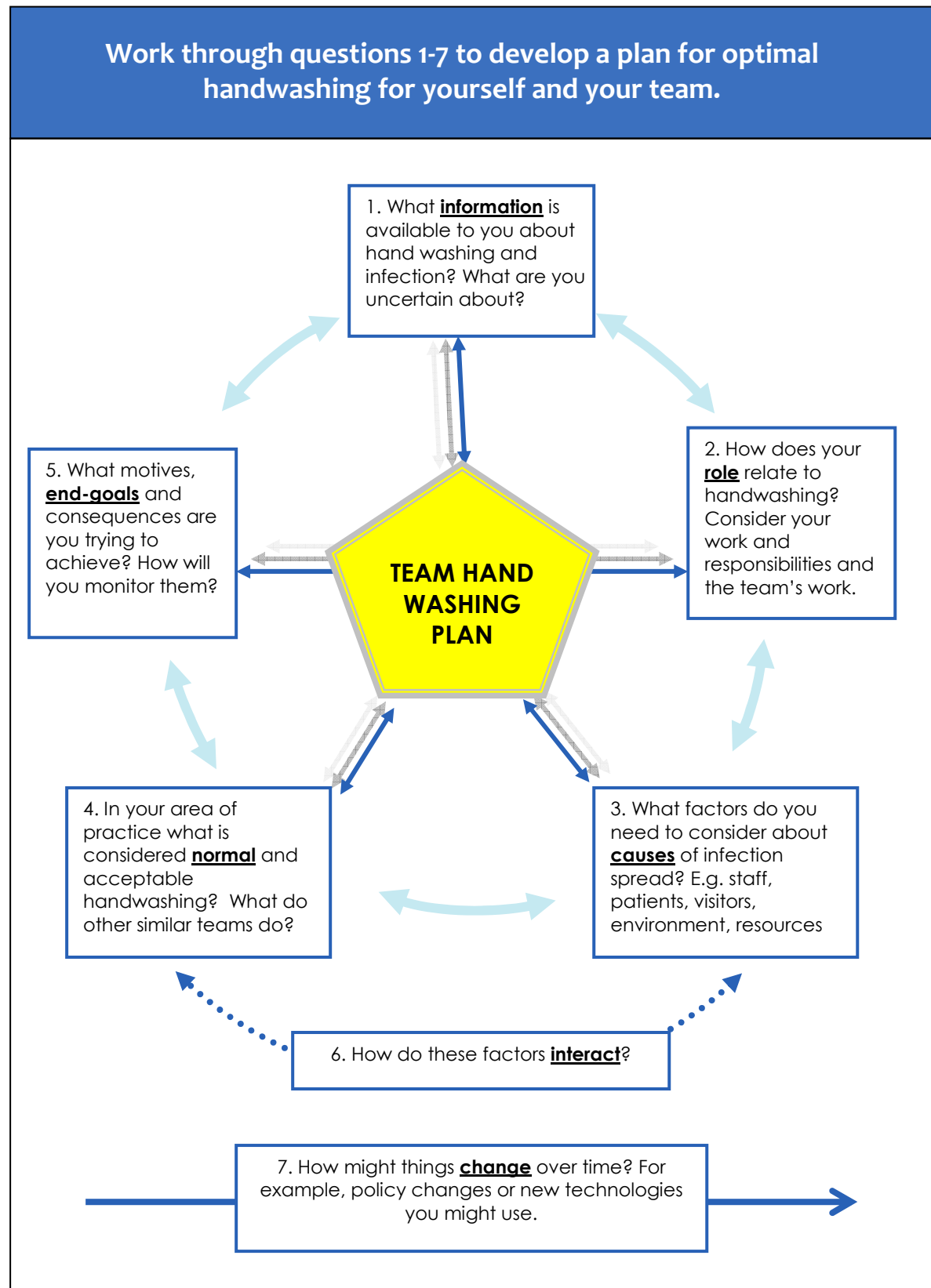
(vii) Education that is directed towards staff understanding their own practices is likely to increase ownership of the problem.

Staff are likely to attribute success and good performance outcomes to their team's adherence to infection control practices and there is good reason to believe that where education is directed towards staff understanding their own practices it is more likely to lead to increased ownership of performance outcome measures for infection control. The simple model developed in this study could be adapted and applied to examine team contexts or specific types of infection control issues, such as education needs, routine infection control practices or patient information needs. It acknowledges that staff behaviours are complex and linked to issues about information, role responsibilities, perceived causes and sources of risk, what is perceived as normal and acceptable, and the differing end-goals that individuals and teams aim to achieve.

To build on existing quality improvement initiatives work could utilize the natural tendency for staff to attribute good infection control outcomes to their own improved understanding of practice. This study has devised one model for individuals and teams to analyse their own infection control behaviours (Figure 5: Improvement tool for infection control practice); moving away from a compliance behavioural model to a position where staff can critically analyse their own practices in relation to the context they are working within and the end-goals they aim to achieve. There is no reason to believe that these findings and the model could not be applied to understand perceptions of other HCAIs and interfaces between healthcare settings.

The exemplar used here (handwashing) illustrates that the model could have practical application for improving organisational knowledge and infection control practice. For example, in developing team hand-hygiene plans the model could be used to recognise that group members will tend to be influenced by a range of factors that they may not previously thought of. It acknowledges that staff behaviours are complex and linked to issues about information, role responsibilities, perceived causes and sources of risk, what is perceived as normal and acceptable, and the differing end-goals that individuals and teams aim to achieve. The model presented here could be adapted by teams and applied to examine team contexts or specific types of infection control issues, such as education needs, routine infection control practices or patient information needs.

Figure 5: Improvement tool for infection control practice (Exemplar of handwashing)

Work through questions 1-7 to develop a plan for optimal handwashing for yourself and your team.

1. What **information** is available to you about hand washing and infection? What are you uncertain about?

2. How does your **role** relate to handwashing? Consider your work and responsibilities and the team's work.

TEAM HAND WASHING PLAN

5. What motives, **end-goals** and consequences are you trying to achieve? How will you monitor them?

4. In your area of practice what is considered **normal** and acceptable handwashing? What do other similar teams do?

3. What factors do you need to consider about **causes** of infection spread? E.g. staff, patients, visitors, environment, resources

6. How do these factors **interact**?

7. How might things **change** over time? For example, policy changes or new technologies you might use.

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Appendices

Appendix 1: Individual estimate exercise (staff questionnaire)

Appendix 2: Discussion group topic guide

Appendix 3: Staff focus group data (key themes)

Appendix 4: Qualitative analysis code framework

Appendix 5: Local dissemination event

Appendix 1: Individual estimate exercise (staff questionnaire)

Dear Colleague,

Care Home Staff Questionnaire

- Your participation in this study is voluntary and you can withdraw at any time.

- The questionnaire is anonymous. We will not be able to identify your answers or tell anyone else that you gave them.

- This questionnaire is not a test. It is to find out what people think about the risk of MRSA (Meticillin-Resistant Staphylococcus Aureus). Most of the questions ask you to make an estimate about MRSA. When you answer the questions we would like you just to think about people who are aged 75 years or over.

- The questionnaire should take no more than 10 or 15 minutes to complete. You will probably not know precise figures and we don't expect you to. What we are interested in is your best guess or impression of the situation.

Where you work

1. On an average day how many people over the age of 75 are there in your care home?

……………..

Of these please estimate:

      a) How many have MRSA: ………..

      b) How many had MRSA when they came in: …………

      c) How many got MRSA whilst in the home: ………….

Other care homes

2. **Compared to other care homes the number of people over 75 years of age *with* MRSA in your home is …**

   (Please circle one)

Much less	A little less	The same	A little more	Much more

3. **Compared to other nursing homes the number of people over 75 years of age *admitted with* MRSA to my unit is …**

   (Please circle one)

Much less	A little less	The same	A little more	Much more

4. **Compared to other nursing homes the number of people over 75 years of age *who get MRSA* on my unit is …**

   (Please circle one)

Much less	A little less	The same	A little more	Much more

Where MRSA comes from

5. **Where do most people get MRSA?**

   (Please circle one answer)

In their own home	In a GP surgery or health centre	In a care home	In hospital	In a public place e.g. street, shop, public transport

6. **In health care settings, what gives most people MRSA?**

   (Please circle one answer)

Touching dirty surfaces/rubbish	Staff not washing their hands	Germs spread through the air	Visitors/family touching people	Most people carry MRSA on their skin

7. Overall, how much of a risk do you think MRSA is to society?

(Please circle one)

Not worth worrying about	Minor risk	Moderate risk	Serious threat	Epidemic (very serious outbreak)

Training

8. Have you received any training on infection control?

(Please circle one)

Never	0-3 months ago	In the last year	1-3 years ago	More than 3 years ago

9. Where did you receive this training?

(Please circle one)

Not applicable	Organised by my employer at my place of work	Organised by my employer but external to my work	Organised myself

About you

1. Age: _____ (years)

2. I am: Male / Female

3. Please tick all that apply to you:

☐ Nursing auxiliary ☐ Health care assistant ☐ Nurse ☐ Doctor ☐ Administrator ☐ Cleaner/support worker ☐ Physiotherapist ☐ Occupational therapist ☐ Other (please state) ………………………	☐ Full-time ☐ Part-time ☐ Student ☐ Qualified ☐ Agency ☐ Bank

4. How long have you been in your current job? _____ (years)

5. How long have you been working in health/care settings? _____ (years)

6. If you are a qualified health care professional in what year did you get your *first*

professional qualification? _____

THANK YOU for completing the questionnaire

Appendix 2: Discussion group topic guide

Discussion Group Topic Guide (Care home)

1. Do you care for a lot of patients who are over 75?

2. Do you think a lot of over 75s come in with MRSA?

3. Do you think that the rates of MRSA are generally high or low here?

4. How do you think the rates here compare to other care homes?

5. Do you think a lot of over 75s pick up MRSA here?

6. Where do most people pick up MRSA?

7. How easy is it to compare what happens here with what happens in other care homes?

8. What do you think about infection control practices here?

9. What gives most people MRSA in healthcare settings?

10. Do you think health care settings are to blame for MRSA?

11. What would you say were the main factors that add to MRSA within healthcare settings?

12. Thinking more broadly, how much do you think MRSA is a risk to society?

13. What do you think about the training you have had? Any gaps? Issues?

Appendix 3: Staff focus group data (key themes)

Summary of discussion group key issues

Care Homes

Centre Ref.	Key issues
CH1	**Age Range:** Most staff see younger pts, fewer >75s so many answers are best guesses. Agreement that older patients are at greater risk.
	Care Home: Staff agree pts do not get MRSA at home. Excellent policies & procedures in place.
	Patient's at Risk: Older pts at greater risk. Those with wound sites i.e. PEG feed, tracheotomy. Different pts have different levels of risk.
	Hospitals: Pts do get MRSA but level of risk depends on length of stay. Not all pts are infected in hospitals. Previously had poor hygiene procedures, recent improvements.
	MRSA Transfer: Staff to pt (hospital), relatives/visitors.
	Source of MRSA: Unanimous view – hospitals. Poor hygiene measures. Not adhering to policy. Unsuitable clothing.
	Comparison to other Care Homes: Cleaner, good infection control policies & procedures. Pts can move MRSA by going to home to home, as can staff.
	Screening: Patient's are screened. Confusion caused by hospital results & post-hospital stay results – see below.
	Risk: Overall consensus = serious risk, worse for older & immuno-compromised pts & those with wounds.
	Training & Procedures: 3/6 monthly. All staff carry hand gel. All new staff receive infection control training.
	Staff Queries: Lack of continuity between hospitals & care homes with MRSA treatment procedures. Different policies & procedures between varying institutions. Confusion re: fluctuating colonisation & +ve & -ve results. Reliability of swab test.
CH2	**Age Range:** Difficulty deciding on % 75+ patients in home.
	Screening: Not done on admission, aware of hospital procedure which identifies pt MRSA status, swab wounds. Staff would like to see all pts swabbed on admission. Lack of consistent policies & procedures across homes & hospitals makes it more difficult to control & deal with problem.
	Hospitals: Likely to have higher rates but were not blaming hospitals rather acknowledging that this is where screening occurs. Areas highlighted as high risk: surgery esp. orthopaedic. Hospitals have higher risk rate due to pt demographic – compromised in some way. Aware of new procedures hospitals are implementing – pre-op medicated washes, hand hygiene measures for visitors & staff.
	Rates (in care home): Long discussion over no: pts with MRSA, staff eager to be accurate, no clear answer obtained, staff appeared to be rather uncomfortable giving a definite answer. However see 'training', use of markers to know that home is acting well.
	MRSA Source: Pts come with it rather than 'catch' it in home, pts come in from hosp following swabbing = diagnosis, aware that pts can catch it from home & transfer. Wound leakage spread. Public places. Need to know origin in order to deal with spread
	Comparison to other Care Homes: Pts with MRSA entry into homes similar across the board, in house acquisition = lower due to infection control precaution taken by this home. Staff felt they have good precautions in place. Looked at pts with wounds – amount, healing times. Staff reluctant & uncomfortable making comparisons as they had no information on other places to make fair comparisons. Levels dependent on standards adhered to care home staff.
	MRSA Transfer: Staff looked at wound amounts & healing times for recovery & spread. Dependent on type of patient & where admitted from. Poor hygiene methods. Multiple variables of risk make it complicated to control. Some places present higher rate of risk. Issue of resources
	Care Home: Long stay home, MRSA enters with new pts. Levels dependent on infection control procedures – minimum basic precaution. Until policy changes at home and pts are swabbed on admission it is too hard to know source & transference. Experience of controlled outbreaks of easily transmittable infections & no new wounds gives staff confidence that they are behaving professionally & according to policy. Home recognised as high care area – other homes 'turn to them'.
	Information Source: Media, not necessarily trustworthy - issue of blame. IC updates gives

	information about MRSA, see 'training'.
	Training: 6 monthly updates. Tools for measurement, markers i.e. wound healing. Good role models. Staff are most important 'tool' to invest in.
	Risk perception in society: Large risk. Larger risk for compromised people – the very young as well as older & vulnerable people. Risk escalated by poor infection control procedures. 2 points – 1)risk inflamed by media, 2)'no smoke without fire' – could prove to be issue like smallpox was if not dealt with.
CH3	**Information:** Staff felt they should know pts MRSA status in order to protect themselves & give appropriate care. Expectation that you would be told about pt status. Agreement there is a responsibility on healthcare environments to share information. Suggestion that information dissemination will help prevent further outbreak – prevent epidemics seen in other countries where such education is not available. Staff spoke about situations in remote places in Africa where there is poor information resulting in epidemics of various diseases – this was also related to risk.
	Care Home: Staff proud of home & own practices, feel that MRSA levels are low. Have seen their own influence go into other homes and improve practices there. Use of appropriate bags for laundry – this is seen to be an important factor. Status put in pt notes so staff can find out for themselves.
	Comparison to other Care Homes: If staff not worked in other homes they were unwilling to compare. Staff who had felt that their own home gave a higher standard of care, in one case they refused to go back as they were not informed about pt who had MRSA and so did not take precautions. Management at other homes had said they would be welcome to work there due to good practice – noticed practice improvement due to input of this staff. Had seen wide variations in different homes.
	MRSA spread: Over-riding opinion appeared to be that it was very difficult to trace where it came from but any place you had a mix of people it would be likely to be an issue – swimming pools mentioned. [see also **Hospitals**] Wounds likely cause for infection or spread. Pts themselves – touching themselves when not clean& being unaware of what they are doing.
	Leadership & Management: Good leadership & management made for better practice, training & support. Felt this was given at their home. Need for mutual respect
	Training: Annual updates, e-learning for several topics including infection control – accessible on any computer with log on password. Felt it was quite difficult. Strict pass/fail process.
	Blame: When 'blame' was mentioned staff were reluctant to make statements – a conclusion was drawn saying there was in part blame on healthcare organisation & in part no blame as it is a naturally occurring phenomena. Also said they did not have enough information to make informed conclusions. However throughout interview some staff did make 'blame' statements – mostly in relation to hospitals but based on experience. Disagreements about people being lazy or poorly managed.
	Hospitals: Noted for MRSA –ve pts returning with +ve status – stated occasions & pts where this occurred. Acknowledgment that it is difficult in hospitals – pts can come in with MRSA from home – harder to control.
CH4	**Screening:** All pts put on 5 day protocol on admission, screened on admission, if very sick, if had wound, to check levels if pt had ongoing MRSA +ve status. When outbreak that seemed difficult to manage, staff were screened to help identify source
	Care Home: Obvious pride in home. Felt it was probably faring better than others. All said they had good leadership & management [see training]. Signs of pride/competition between staff from different floors in the home. Some commented on poor practice they had seen in home – refuted by others. Team work noted as important factor not just between nursing staff but from management to laundry – information spread.
	Comparison to other Care Homes: Felt that all care homes were facing the same problem. Reluctant to compare if had not seen other places
	Hospitals: Noted that a lot of residents come out with MRSA. Were aware of other factors influencing higher likelihood of pts being MRSA +ve in hospital such as quantity of human traffic, pts immuno-compromised. Several stories told about poor practiced that had been observed.
	MRSA spread: Comments that there were probably more factors involved in spread than just healthcare staff hygiene such as environmental & patient age, immunity status. The 'little links' cause an issue i.e. patient transport
	Training: All felt well trained, annual updates, informed about new products, management did most of the training, very approachable, staff comfortable to ask for more training if needed. Training & education should be in the community also, for relatives & in schools. Doctors mentioned in disparaging way as group unlikely to have good hand hygiene practice.
	Infection control policies & procedures: Staff clearly proud of protocols. If pt is identified as being MRSA +ve a kit is set outside the room with red laundry bags, aprons, gloves, alcohol hand gel & a notice goes on the door informing people what is occurring. All staff are kept informed of a pts status from management to cleaners & laundry staff.

		Difficulties faced in care home & wider arena: Discussion about logistics of hand washing after each individual task .i.e., tea making. Is it always possible/practical/reasonable to do it? Focus should be on minimising risk but being aware it will always be an issue. Issues with public awareness – suggestion that education about it is taken into schools. Problem with written information – some people can't read & are unlikely to ask for help.
CH5		**Patient Screening:** Issues with knowing post-hospital pt status. they do not screen unless has a wound/identifiable factor. Felt it needed to retain 'home' element which screening would remove.
		Staff Screening: Some been screened. Some staff very anti knowing – fear of job loss or loss of earning if +ve & need time off. Issue of cost raised.
		Infection Control Costs: Many staff raised issue of cost in regards to staff & patient screening. Unusual level of concern about this element in all areas.
		Hospitals: Majority of staff put blame on hospitals for MRSA levels, transmission & problems. Few thought deeper into the issue – large amount of compromised pts, some coming in with MRSA.
		'Old School' Nursing: View that things were better with matrons.
		Community: Varied opinions on levels in community. People carrying MRSA into hospitals seen as issue.
		Information Sharing: What information is given to healthcare staff about pt status for varying conditions – changes over time. Changes in policy such as allowed to read notes
		Comparison to other care homes: Would want to know how other homes are doing to find out how to improve – shared learning. Unanimous won't make judgement if does not have previous experience.
		Training: Very few staff had regular updates. All would want it. Uncertainty over mandatory status & frequency that IC is given. Would like to know current research developments & practices, uncertainty if own practices are up to date for some staff.
		Own care home: Some staff very defensive about own practice, one staff member went to make improvement suggestions & received almost aggressive verbal response. They felt that equipment was a big issue, all staff agreed much of it needed renewing. Felt that apparent low levels showed they were doing well but there was not much
		MRSA Spread: Factors considered were in depth such as amount of cleaners, direct pt issues such as age, wounds, interventions or surgery needed, level of & strength of immunity. Visitors sitting on bed or moving between pts.
CH6		**%>75s:** Large proportion seen in the home. Most have MRSA according to group discussion but not according to questionnaire results.
		Origin of pt: If from hospital likely to have MRSA, not if comes from home.
		Hospital: Most pts have MRSA & are on treatment or have been treated. 'There is a lack of care'. Some people recognised the factors that may cause hospitals to have more issues with MRSA such as high volume of ill people in confined space for prolonged periods of time. Some seen bad practice in hospitals.
		Own care home: Staff feel rates are low due to their good practice. Visitors also use hand gel. Staff proud of home & practices – standard of excellence. Well stocked with appropriate items. Believe they can deal with issues in a week with good nutrition and pt policies
		Policies & procedures: Screen all new admissions & treat all pts as +ve on admission. Use of red bags, gloves, aprons, hand washing and hand gel all mentioned. Teaching relatives about what to do is also part of the procedure i.e. educating them if a pt has MRSA, which bins to use & using hand gels. Nutrition is issue
		Training: Study days encouraged but staff said would want more. Discussion days/training days more effective than online training. Having teaching session from manufacturers' of the hand gel was very useful – staff all accept use of it, appreciated the free samples for their uniforms. Found that relatives want them now as well. Found training with other care homes very helpful.
		Source/spread: Some staff immediately said hospital but others said it can be caught anywhere – people have it on their skin etc. Healthcare settings can both be to blame for spread but also contribute to eradication.
		Management: Good management means you can 'get on with it'
		Comparison to other care homes: Seen rationing for gloves which shocked them.
		Infection control costs: Proud of the fact the home is not concerned with profit. Provides for needs – well stocked & supplied.
		Screening: Staff were screened – results showed they 'were alright'. All happy to participate. Pts are screened.
		Publicity: Letting people know – spreading information and awareness helps with slowing and preventing spread. Effectiveness of television & radio. Use of literature – posters and leaflets, notices on buses & trains – people would read them.
		Staff queries: Uncertainties about antibiotic therapies, level of risk & transmission.

Hospital

Centre Ref.	Key issues
H1	**% > 75s:** High % of >75s seen on a daily basis by this group. MRSA dependent on medical condition, living environment, home/care home/hospital transfers.
	Rates of infection: Greater in care homes which maybe explains why this group has higher rates – not necessarily down to age = risk. Routine checking = know amounts; ward with many side rooms takes infected patients as infection control procedure. Felt was low risk of spread or transmission in hospital due to IC procedures but do have people coming in via A&E who are colonised.
	Hospital spread of MRSA: Previous admissions/personal history. Poor hand hygiene. Not the fault of hospitals any more although previously was a factor.
	Comparison of rates – hospital to other trusts/care homes: Staff indication that ICP are advanced i.e. screening. Leading the way. No infection control team in care home to give same level of support. No side rooms in care homes; suggested that linen washed together at wrong rate.
	Contributing factors: Previous admissions. Home environment – care homes with little/no perceived IC policies. Poor IC procedures in the past and at times present. Staffing levels/business of the ward. Availability of hygiene resources. Staff responsibility/actions at all levels, clinical & non-clinical.
	Training: MRSA results on admission & discharge attainable for wards. Hand hygiene training. Audits.
	Risk perception in society: Not dependant on age, anyone can develop serious infection. Media influence & inaccurate information spread but also useful in demonstrating improvements & positive media exposure. Public belief that MRSA is all over hospitals – media influence. Screening highlights rates – not done in community so gives uneven picture. Views inconsistent re: level of risk but are based on area of work- risk = moderate-severe-high but overall consensus = existing & increasing risk.
	Screening: Every patient undergoes this prior to surgery, on admission to ward & in A&E. Strict infection control procedures & treatment programme for monitoring & dealing with known cases.
	Infection Control Procedures: Informing & educating patients & relatives. Side rooms. Hand hygiene. Screening. 'Pro-active' IC team. 'Deep cleaning' bed areas post-infectious patients. New cleaning equipment for bed/equipment. Audits/monitoring – reminding other staff, doctors esp. to follow procedures. Weekend cleaning.
H2	**Patient Screening:** Patient's screened in A&E & prior to surgery, inpatient weekly screening, strict protocol for people with MRSA,
	Staff Screening: Possibility of infected nurses in well screened ward. Previous protocol of staff screening regularly. Currently only screened if infectious outbreak occurs. New staff are not screened
	Relative/visitor as carriers: Sitting on beds, not washing hands. New policies & posters 7 hand gel successful in reminding R&V of hand hygiene,
	Over 75s as known MRSA carriers: Patient transfer between hospital & care home with MRSA. More likely to transfer MRSA to other patients if comes in from nursing home,
	Hospital rates: General feeling = rates are low, previously high. Infection control team contribution to lowering rates,
	Comparison of rates – hospital to other trusts: Staff felt they were more 'favourable', heard they had 'one of the lowest rates in the country' but also didn't trust media. Trust infection control team to provide information – comparing statistics,
	Information sources: Infection control team, in-house magazine, media. Varying levels of trust in these sources – high for ICT, low for media – hype risk factors & stigma, screening results, aware can do own research,
	MRSA transfer: Community & care/nursing homes as breeding ground. Education in community & hospital needed. Poor hand hygiene. Human & technical elements. Need a clean environment – equipment cleaned. Hospital environment – lots of people in small rooms, ward layout. Cleaning procedures. Issue of blame. Proper resources i.e. gloves, aprons, hand gel. Poor use of antibiotics,
	Infection Control Practices/training: Become routine for staff. Well publicised in & about the hospital. Possibility of practices spreading into the community over the years. Need to inform everyone. Doctors not always following hand hygiene policy, but new staff well trained. Check lists on wards. Patient information. Issue of releasing staff to have training. No specific training mentioned but staff felt they were well trained & procedures had become routine.
H3	**Patient Screening:** Extent/amount/detail of swabs. Prior to surgical procedures. On

	admission to hospital through A&E or other admission route. Weekly during hospital stay as in-patient. Financial connotations
	Uniforms: Cleaning. Wearing outside of hospital/transport. Non-uniform staff issues, Watches. Effect on public places. Scrubs/traditional dress,
	Staff Screening: ??
	Spot Checks: Regularity. Effectiveness,
	Public: MRSA contamination in public places/on transport. Visitors & public in hospital – unable to screen – likely to cause cross-infections/contamination if go from pt to pt. Use of hand hygiene measures provided,
	Training/Development: Differences between older & newer staff. Changing procedures over time. Awareness of infection control beyond hand hygiene e.g. door handles, notes. Affect & impact of infection control team,
	Hospital: Proud of institution, Defensive of jobs. Work ethic. Team working. Inter-disciplinary issues.
H4	**Risk factors:** Age & exposure, skin integrity, poor hand hygiene, length of stay.
	>75s: More risk factors due to length of life = higher levels of exposure.
	Hospital: Staff proud of own efforts. Feel it is a good place overall.
	Information source: Infection Control Team and Clinical Facilitators. In-house magazine & leaflets. Audit results. Hospital intranet. Media.
	MRSA spread: From visitors, in the community. Home carers going from home to home. If it does occur in the hospital is not necessarily due to poor hygiene, may be patient safety at risk so staff need to act quickly which means less time to follow procedure.
	Community: Noted as a risky environment, any public area seen as risk. Need for education to be increased as care is moving out more into the community.
	Swabbing: Staff in favour of staff & pt swabbing. Seen as way to know own status & so provide safer care – may also help self if one needs medical care.
	Staff: Uniforms noted as an issue – staff may not follow contractual procedures of cleaning or policy. How infection control practice; maybe unaware of personal spread. Staff responsibility towards patients and visitors in education.
	Visitors: Contribute to the spread of infections. Some issues with people stealing the alcohol gels. Staff have duty to inform & educate visitors. Trouble policing certain areas – ITU is easier than a general ward for example.
H5	**Risk factors:** Age. Long term conditions. Previous admissions to hospital/interactions with healthcare.
	Screening: Reliability questioned. Links to lower rates. 'Screen and treat'. Barrier nursing. Screening done on admission not on discharge so harder to see a fuller picture.
	Spread/Source: Methods of preventing spread – cleaning & high standards. Screening plays a part. Curtains & cubicles maybe cause of spread. Noted occasions when pt safety compromises infection control policies – not always able to wash hands in-between if there is a cardiac arrest etc.
	Own hospital: Low rates, good policies & practice. Excellent cleaners. Staff are proud.
	Other hospitals/care homes/comparing: Would be useful to compare issues/rates. NH seen as having low resources, training & budgets although this was questioned. Over-riding feel is that you cannot compare due to multiple variables – would not be a fair test.
	Over 75s: Lower defences. Multiple pathologies = higher risk. Might have lower standards of hygiene for variety of reasons which raises their risk. The link between >75s & MRSA was questioned but then answered by other staff.
	Finance: Seen as an issue for Nursing Homes & care services. Resources seen as better in NHS trusts but costs of infection control was commented in regards to equipment. 'It costs nothing to wash your hands'.
	Policies & procedures: Screening could be done on discharge as well as admission. Training excellent. Cleaning is to a high standard. Roles need changing – suggestion of designated bed cleaners, curtain changes. Overall seen as positive.
	Blame: Antibiotic use was a contentious issue. Food preparation in factories – animals pumped with antibiotics makes it harder for humans to develop defences or for their own antibiotics to be of use.
	Education & training: Need for more staff, nurses over burdened. Education & training is good but there are issues with long term compliance.
H6	**Screening:** Awareness of when & where pts are screened. Seen as a positive regime contributing to reduced rates.
	Hospital: Comments good, encourages team work. Seen as improving & accomplishing. Awareness of certain areas needing change e.g. hierarchy which discriminates against certain staff groups.
	Information Source: Infection control updates with reports & figures. Media. GPs. Hospital itself – ICT, magazine. Published rates.

	MRSA Source & Spread: Community & public places seen as source. Previously poorly controlled antibiotic therapies.
	Infection Control Policies & Procedures: Using side rooms for infectious patients. Use of posters & signs to indicate pt status. 'Robust regimes'
	Care Homes: (not prompted) seen as source due to large group living together
	Finance: Frequently mentioned as an issue – 'most important thing in hospital'. Issues with paying for staff to cover whilst staff training goes on.
	Communication: Vital to infection control – between all people. In particular for this group between ward staff and porters – proper precautions can be taken. Responsibility of ward staff and ward manager to make sure signs etc are clearly displayed. Suggestions made to improve this such as colour coding e.g. green dot means gloves & aprons needed, red dot means pt can travel by wheelchair.
	Education &Training: Out of hours staff accommodated with evening and weekend training. Facilities staff has own trainer. Correct level of information for staff it's aimed at. Public also need education. ? over who's responsibility this is.
H7	**Information Source:** For information source & pt rates > IC team, media – national and local, Environmental Agency. In-house magazine.
	Screening: when & where done
	MRSA Source & Spread: Visitors, relatives & pts as cause. In hospital unlikely to be staff. Poor practice & cleaning as cause. Public places as source.
	Knowledge/Education: 'Awareness' frequently mentioned. Noted as key factor in reducing MRSA rates & promoting good practice. ? over who has responsibility to educate – hospital/councils.
	Risk Factors: Age. Compromised health – wounds, condition, invasive devises e.g. catheters, venflons. Environment in – care homes cited.
	Information Sharing: Between various healthcare staff – nurses to cleaners etc. Environmental Agency giving results of audits. Staff 'challenging' each other to give good practice. IC Team.
	Hospital: Staff very, very proud of hospital. Competitive to be the best. Team spirit evident. Aware of measures in place such as protected meal times. Well stocked with equipment etc. Been approached to train others organizations on an informal basis.
	Infection Control Policy/Practices: 'Bare below the elbow', no jewellery seen as positive measures. Alcohol gel widely used. Use of disposable mops, cloths & colour coding equipment to minimise infection spread. Regular audits & inspections.
	Training: Facilities staff trained to train in IC. Regular refresher courses. IC Team attend Facilities meetings & have specific 'open door' times.
	Other hospitals: Competitive to be the best.
	Care Homes: Blame for MRSA spread & source. Seen as having poor training and poor practices.
	Infection Control Cost: Varied opinion as to financial status of hospital. Awareness of £ as a factor. 'With the minimal we get, we do the maximum'.
H8	**Care homes:** Seen as source for MRSA due to screening results
	Information Source: Media – sometimes shows negative or incorrect information. League tables. Infection Control Team.
	MRSA source/spread: Controllable by good practice & cleanliness, barrier nursing. It is hard work to ensure always good practice. Some differences in opinion as to source – just a hospital bug or contractible in public places e.g. buses, trains, 'anywhere'.
	Own hospital: Staff very, very proud 'first to introduce gel at the end of beds'. New building is spacious with more side rooms. Keen to be the best.
	Screening: Done in A&E & pre-admission – seen as positive to prevent spread. Patient's keen to know their own status.
	Communication: Seen as way of minimising risk & providing best practice.
	Education & training: Ongoing. Accessible information for all staff – Infection Control folder frequently updated. 'Brilliant'. Infection Control Team admired & effective.
	Policy & practice: Staff take infection control practice into everyday life – has become a mindset. See their hospital as rating highly due to good practice & policy.
	Other hospitals/comparisons:

Appendix 4: Qualitative analysis code framework

Each of the 14 discussion group transcripts (6 care home and 8 hospital) were subjected to a content analysis using the following code framework.

Theoretical proposition	Indicator statements	Key words
Actor information bias	Examples of how staff perceive and use information about MRSA and infection control	Inform (Information, Informed), Evidence, Know (Knowledge), Aware, See (Seen), Observe, Show, Understand, Uncertain, Not sure, Don't know
Observer/actor bias	Examples of staff judgements about the threat and risks of infection	Threat, Spread, Problem, Concern (Concerned), Risk (Risky), Serious, Danger (Dangerous), Important, Worry
	Examples of staff judgements about responsibility and blame for infection	Cause (Cause, Because), Fault, Responsible, Responsibility, Success, Blame, Caught, Have it, Get it, Got it, Gave
Situation/disposition bias	Examples of staff attributing causes to 'personal' factors and to:	My (My practice, My work, My knowledge, My opinion, My training, My skills etc.)
	'situational' factors, within their own unit of work	Their (Their practice, Their work, Their knowledge, Their opinion, Their training, Their skills etc.)
		Education, Training, Resources, Equipment, Support, Manage (Management, Manager) Lead (Leadership, Leader)
Normative bias	Examples of group and social processes influencing views about what is normal and acceptable infection rate and infection control practices	We, Our (Our practice, Our work, Our knowledge, Our opinion, Our training, Our skills etc.), Team (Teamwork), Protocol, Polic (Policy, Policies)
Motivational bias	Examples of the types of motives, end goals and consequences staff perceive in relation to infection control behaviours	Reason, Result, Aim, Motive, Achieve, Outcome, Objective, Goal, Consequence

Appendix 5: MRSA Origins dissemination event

The MRSA Origins dissemination event was hosted by the National Nursing Research Unit and the Infection Control Team of University Hospital Lewisham on 7th July 2009 at the Lessof Auditorium, University Hospital Lewisham. Over fifty health care staff, managers and students attended the meeting. The dissemination event also involved members of the Trust's Infection Control Team, the Health Protection Agency and those who have specific experience of long-term care settings locally.

Dr Mehool Patel chaired the event. The meeting began with an introduction from Carol Fry, Nursing Officer Communicable Diseases for the Department of Health, who talked about the priorities of infection control in care homes.

There followed two presentations. Dr Gopal Rao gave an overview of the Lewisham context of infection and looked at MRSA infection rates over the last decade. Dr Elizabeth Morrow introduced the MRSA Origins study and presented some key early findings from the study. Rebecca Blackwell presented a staff information pack that has been developed because of the MRSA Origins study; this is now available to care home and hospital staff through the Infection Control Team at Lewisham hospital. Questions for the research team included: whether doctors had been involved in the study, and whether staff took infection control seriously. In response, it was said that doctors had not been on this particular study which focused on nursing and care staff and that all participants were engaged and interested in the issues of infection control. However, the study sample may be biased towards those who are positive about infection control.

There followed an 'ask the experts' Q&A session with Dr Gopal Rao and Debbie Flaxman. The issue of staff screening was raised and there was debate about whether this is useful and practical. There were also questions to the experts about the frequency of MRSA screening - every week on some wards – and how antibiotics are being used in care homes, which is an issue that is being examined in a new collaboration. There followed a more general discussion and debate about how services are being delivered in different settings and how infection control needs to be managed as part of a health care system. As the use of broad spectrum antibiotics is restricted in hospitals, it was questioned whether MRSA may be produced in the community – research shows new forms of MRSA are community-acquired. One member of the audience said there was huge uncertainty 'so what should we do?' Others felt that the food chain/social policies for agriculture, wider social responsibility for infection and animal welfare were related and significant issues which have a bearing on the management of healthcare associated infection.