Mental models of the general Dutch public concerning MRSA

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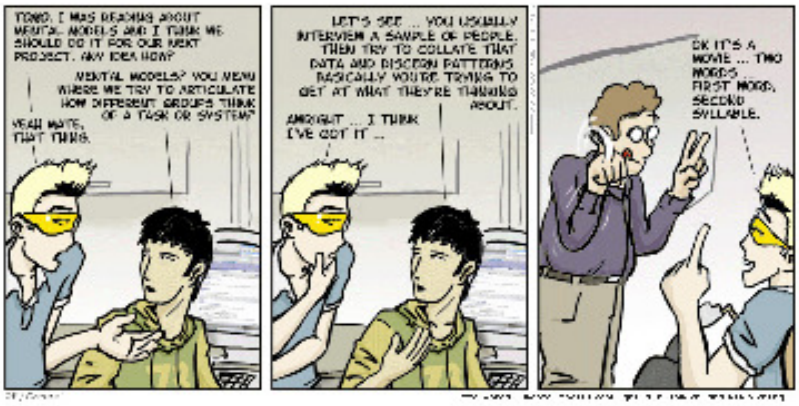

MENTAL MODELS OF THE GENERAL DUTCH PUBLIC CONCERNING MRSA

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ABSTRACT

MRSA is also known as the 'hospital bacterium.' This bacterium, resistant to most common antibiotics may cause serious infections, which can be fatal. MRSA is becoming an important public health problem.

Information about MRSA has to be communicated to the general Dutch public, in order to ensure they are able to make informed decisions concerning their own health, e.g., practice good hygiene, which enables them to reduce the risk posed by MRSA. Therefore, research needs to be conducted addressed at revealing the Dutch people's beliefs about MRSA, so recommendations for the necessary risk communications can be done.

The aim of this study is to determine the existing beliefs of the general Dutch public, concerning MRSA, and to investigate what risk information suits these beliefs best.

This research is conducted by using the Mental Models Approach of Granger Morgan, Fischhoff, Bostrom & Atman (2001). Relevant scientific knowledge concerning MRSA was collected and constructed into an expert model. The expert beliefs were completed with non-expert beliefs by conducting open-ended interviews (N=17). The results from the interviews were, together with the expert model, captured in a confirmatory questionnaire which was administered to a large sample (N=239), representing the general Dutch public. The results of the questionnaires were added to the expert model, to produce the lay mental model.

The results of the study show that the general public is not familiar with MRSA, which appears from certain facts, e.g., that one third of the respondents did not hear of MRSA before, the answering option 'do not know,' was regularly given, and several misconceptions addressing the basics MRSA were raised, like e.g. 'MRSA is a muscular disease.' The present knowledge of the general Dutch public showed many gaps, especially concerning, 'prevention,' 'reservoir,' 'consequences,' and 'treatment options' of MRSA.

Overall can be said that the general Dutch public needs information concerning MRSA that explains basically what MRSA implies. Furthermore, the present knowledge of the general Dutch public showed many gaps, which should be addressed. This can be done by using the preferred information sources, television and newspapers.

The results offer practical assistance for developing communication strategies, which should be the next step, according to the Mental Models Approach of Granger Morgan et al. (2001). Future research might address revealing the mental models of inhabitants of other (neighbour) countries, and compare the mental models concerning MRSA of certain subgroups, e.g., the inhabitants of Noord-Brabant or hospitalized patients.

PREFACE

This research topic interested me in the first place, because of the 'mysterious' bacterium MRSA. I heard of the bacterium before, but I never considered it to be a public health problem. The knowledge of the general Dutch public concerning this topic had not been investigated before, which seemed a very challenging job, and I therefore decided to do this study for my master thesis Communication Studies.

And challenging it was! One of the most challenging phases of my research was to find a suitable method for conducting my research. Eventually, I ran into a method, which seemed to be developed just for my research. Finally, things could start!

Assuming that the hardest part of my research worked out well, I began developing the expert model. Well, I could not have been more wrong. Every stage of my research posed me for many difficulties, but with some help, I managed to complete my research.

The research topic was as interesting as I expected; I even decided to conduct another research on MRSA for my master thesis Psychology! I learned a lot during this research, a lot about my study, but also a lot about myself.

I owe many people, but I would like to start with thanking my supervisors Joyce Karreman and Fenne Verhoeven, for their patience, advice, enthusiasm and comments.

Merwin, thanks for introducing me to AutoCAD. Without you, I would not have been able to produce such wonderful models. Of course, also thanks for supporting me, accompanying me during the interviews and the questionnaires, and for listening to me.

In addition, I would like to thank Esther, for sharing our experiences, Ingrid, for helping me out with the questionnaires and Ibrahim for his mental coaching.

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Anneke Bosma

TABLE OF CONTENTS

1 INTRODUCTION

This chapter will introduce the research topic and its research occasion. This will be done by reviewing relevant literature. The chapter will continue by summarizing a literature search, conducted to find a method for investigating the research topic. This results in a main research question and some sub research questions. The chapter ends with the structure of this report.

1.1 RESEARCH OCCASION

MRSA is the abbreviation of methicillin-resistant Staphylococcus Aureus, a bacterium that appears regularly in the newspapers, for example, when it is found in a hospital. This bacterium is resistant for methicillin, an antibiotic used for serious infections, usually when there are no other options left and other commonly used antibiotics to treat infections do not work (Health Council of the Netherlands, 2006). In popular (Dutch) vocabulary, MRSA is called 'hospital bacterium,' because the bacterium mostly shows up in hospitals where antibiotics are frequently being used, and because of the presence of people with a weakened immune system, being at high risk of acquiring MRSA (Rijksinstituut voor Volksgezondheid en Milieu [RIVM], 2007). When having a weakened immune system, the bacterium might be fatal, as it may evoke a serious infection, and eventually lead to death (Health Council of the Netherlands, 2006). It is said, that MRSA is becoming an important public health problem.

In the Netherlands, MRSA is not so common because of the national policy. This so-called search and destroy policy aims at early detection of MRSA and, in case of an MRSA outbreak, to prevent transmission between patients by isolating them and decontaminate MRSA positive patients (Werkgroep Infectie Preventie [WIP], 2005). Abroad, such national policies are not standard, and over there, MRSA occurs more frequently. Some countries even report an MRSA percentage in hospitals of more than 50%. The Netherlands, together with the Scandinavian countries have been able to limit the percentage of MRSA to less than 1% (WIP, 2005).

Furthermore, abroad increases the prevalence of MRSA outside hospitals, which interferes with controlling MRSA, because it is not possible to take the same precautions outside healthcare settings, as used in healthcare settings (Health Council of the Netherlands, 2006). These outbreaks among the general public were until recently, relatively unknown in the Netherlands. In the summer of 2005, MRSA was detected at a pig farm in the Netherlands. The MRSA carried by pigs caused contamination of the residents. MRSA colonization occurs at 40% of the pigs and 25% of the farmers, but this was the first time that the bacterium was transferred from animal to human (RIVM, 2007). Nowadays, researchers investigate the

possibility of MRSA contamination through meat and MRSA is topic of interest in the Dutch media (RIVM, 2007).

Thus, MRSA seems an emerging public health threat. Proper information to the general public concerning this bacterium and its risks and consequences is essential. Effective risk communication fits the existing knowledge of the target group, according to Fischhof (1998). Therefore, it is necessary to determine what the Dutch public knows about MRSA, in order to develop an appropriate communication strategy. Knowledge of the general public concerning MRSA has never been investigated and that is what makes the subject interesting and important.

1.2 RELEVANT MRSA RESEARCH

Several studies have been conducted investigating MRSA from different perspectives. Next, a brief overview of these studies will be given. All presented studies investigated the perception; three investigated the MRSA perception of patients (Gill, Kumar, Todd & Wiskin ,2005; Hamour, O'Bichere, Peters & McDonald, 2003, and Newton, Constable & Senior, 2001), two investigated the perception of health care workers (Gill et al., 2005, and Lines, 2006), two considered the perception of the general public (Gill et al., 2005, and Brinsley, Cochran, Bush & Pearson, 2007), and awareness was examined by three researches (Gill et al., 2005; Hamour et al., 2003, and Brinsley et al., 2007).

Gill et al. (2005) conducted an investigation to compare the level of awareness and the perceived risk of getting contaminated with MRSA amongst patients, visitors and personnel of the National Health Service in the United Kingdom. The study of Gill et al. (2005) concluded that both the general public and the healthcare workers had an exceptionally high level of awareness and a comparable perceived risk of getting contaminated with MRSA. Gill et al. (2005) consider patients and visitors to be general public. However, patients and visitors are already in the hospital and probably pointed at the possibility of contracting MRSA by healthcare workers, so it is likely that they are more aware of the risk of MRSA than the average public and can therefore not be considered to be general public.

Lines (2006) examined to which extent senior staff nurses experience that MRSA is out of control, and to which extent they experience that any effort to control MRSA is useless. This research was done in a university teaching hospital in the United Kingdom. According to Lines (2006), it turned out that a small part of the senior staff nurses experienced MRSA as being out of control, which might become a problem, because personnel assuming that MRSA is out of control, may think that any attempt to control the bacterium, e.g. by following the strict MRSA guidelines, is unnecessary. In other words, if senior staff nurses believe that MRSA is uncontrollable, and therefore, feel that trying to control MRSA is a waste of time, they are certainly not a good role model to their subordinates. Thus, Lines (2006) claims that education and clinical awareness must be supported by the nursing management to improve nurses'

knowledge and understanding. This study was aimed at nurses, as they have a distinctive role in controlling MRSA. The same may apply for patients and the general public; they may lack knowledge and understanding of MRSA, and therefore fail to comply with necessary precautions. As MRSA is becoming a public health treat, it needs to be fought at all levels and it should not mainly be the responsibility of healthcare workers. Thus, knowledge and understanding of MRSA should be improved among different target groups.

Hamour et al. (2003) examined patient perceptions and awareness of MRSA in the United Kingdom. They state, that media is as important in providing information concerning MRSA, as healthcare workers are, although less than half of their sample had prior knowledge of MRSA, despite of the often sensationalized reports in the mass media (Hamour et al., 2003). According to Hamour et al. (2003) their most important finding is the high level of anxiety a possible MRSA infection would provoke in patients. Half of the respondents in the study of Hamour et al. (2003) did not know anything about MRSA. This ignorance might have caused the high level of anxiety, the suggestion of a possible MRSA infection provoked. This might be similar for the general public as the consequences of MRSA are mainly unknown and therefore might evoke fear. In order to control this fear Hamour et al. (2003) suggest, that the patients' concerns need to be addressed. This is, of course, important, but it might be better to inform the general public about MRSA, so false believes can be taken away before entering the hospital, which might make a difference in the experienced stress and coping levels.

Newton et al. (2001) conducted a study in the United Kingdom to MRSA infected patients' perceptions, placed in source isolation; a better understanding of an MRSA infection and its consequences is expected to result in better compliance with infection control procedures. They found, that the majority of infected patients in their research expressed uncertainty about the reasons for, and the efficacy of, treatments for MRSA and barrier nursing procedures, which suggests that patients are likely to have low adherence to infection control procedures, e.g. compliance with isolation or disinfection measures. Newton et al. (2001) conclude, that the findings of their small preliminary study suggest that, despite of being given information about MRSA infection, the majority of patients are somewhat confused about their infection. There is a need to finding ways of improving patients' understanding of MRSA, such that they are able to play a more active role in infection control, without this resulting in adverse emotional consequences, such as raised anxiety, and the belief that MRSA places an additional and significant threat to their health (Newton et al., 2001). This study emphasizes the need of understanding MRSA, source isolation and barrier nursing for patients. In fact, it would be better if also the general public was more aware of MRSA and its consequences, as MRSA is not only a problem of the hospital, but also a community problem. The success of infection control procedures concerning MRSA might depend on society.

Brinsley et al., (2007) investigated the general public's awareness, knowledge and perceptions of Staphylococcus Aureus and more specifically the community acquired methicillin-resistant Staphylococcus Aureus (CA-MRSA) in the United States. They found that the awareness of Staphylococcus Aureus was rather high in contrast to the awareness of MRSA or CA-MRSA. Therefore, they recommended promotion of awareness and recognition of all staphylococcal infections through the preferred formats and the trusted sources, as revealed in their research (Brinsley et al., 2007). This study did not focus entirely on MRSA, but more on regular Staphylococcus Aureus infections of which MRSA and CA-MRSA are subtypes. According to Brinsley et al. (2007), the findings of this study are probably not representative to the public at large, as these qualitative findings are based on eight focus groups. Therefore, this study is probably not useful to base an effective communication strategy upon. Moreover, the results about the public's knowledge are probably too limited to identify gaps and misconceptions, in order to develop effective communication strategies.

As is shown above, various topics regarding MRSA have been investigated; however, no one has ever explored the ideas, opinions and knowledge, concerning MRSA in particular, hold by the general public, in order to design communication means. MRSA, being a emerging threat for both hospital and community settings, is becoming a rather important issue, which has to be communicated to the general public, so the general public will be able to make informed decisions concerning their own health and comply with obligatory control measures. Knowledge of, for example, prevention measures and risk factors of MRSA may enable the general public to anticipate MRSA and improve their health, and as a result, contribute to avoidance of the spread of MRSA. Therefore, research needs to be done addressed at revealing the Dutch people's beliefs about MRSA, so recommendations for the necessary risk communications can be done.

1.3 COMMUNICATING A RISK

Risk communication is all about providing lay people with the information they need to make informed decisions about risks concerning their health, safety, and environment (Granger Morgan, Fischhoff, Bostrom, Lave & Atman, 1992). Risk communication should focus on critical information that is either missing, or available but misunderstood, according to Fischhof (1998). Communicating the risks concerning MRSA to the public should therefore be matched to the beliefs and views on the risks posed by MRSA, as experienced by lay people.

Granger Morgan et al. (1992) state that people process new information within the context of their existing beliefs. That means that if they do not know anything about a certain topic, a new message will be incomprehensible and if they have incorrect beliefs they may misinterpret the message. According to Fischhoff (1998), the public does often fail to understand and trust experts regarding risk communication, and experts often fail to

understand the public's demands for information and lack the resources needed to satisfy those demands.

Ropeik and Slovic (2003) state that human risk perception is both analytical and affective, which is why the risk perception of lay people does not match the risk perception of experts. Assuming that risk communication based on facts posed by experts meets the needs of lay people, would therefore be incorrect. Intuitive feelings guide risk perception, a process that Ropeik and Slovic (2003) call the Affect Heuristic. The level of dread posed by a risk, for example, determines the fear a risk evokes in lay people. Dying of a shark attack therefore causes much more concern in lay people than dying of a heart disease, which is far more likely (Ropeik & Slovic, 2003). Other factors that determine risk perception are control, natural or man-made risk, choice, children, novelty, awareness, personal risk, the risk-benefit trade-off and the level of trust the public has (Ropeik & Slovic, 2003).

These risk perception factors highlight the difference in which the public handles risks in contrast to experts, and may be predictors of the attitude towards the risk posed by MRSA. "Risk communication which acknowledges and respects the affective motivators which underlie people's concerns, rather than dismissing such perceptions as 'irrational' because they are not solely fact-based, is likely to be more successful in helping people make more informed choices about the risks they face" (Ropeik & Slovic, 2003, p. 3). This emphasizes the necessity to determine the beliefs and views of lay people concerning MRSA in order to adequately communicate the risks involved. In other words, risk communication needs to be public centred in order to be successful.

An attempt to determine the beliefs and views concerning MRSA is done by Washer & Joffe (2006). They investigated in the United Kingdom who and what MRSA is associated with and the impact that these associations have on levels of alarm and blame by analyzing its newspaper coverage using the Social Representations Theory (SRT). The SRT states that mass media play a major role in transforming expert knowledge into lay knowledge. Together with socio-cultural, historical and group specific forces, this constructs social representations that are relatively consensual understandings of phenomena (Joffe, 2003). Important findings in the study of Washer & Joffe (2006) were that MRSA is represented in the media as a potentially lethal 'superbug,' marking the end of a 'golden age of medicine,' as MRSA is undermining the efficacy of the unsurpassed antibiotics. Newspapers personalize MRSA as it could be you or me being infected with the conquering MRSA and they blame hospitals for its spread because of poor hygiene.

The research of Washer & Joffe (2006) does not reveal if this portrayal of MRSA by the mass media is similar to the way in which lay people experience MRSA. Mass media do not copy the expert knowledge as can be seen in the study of Washer & Joffe (2006) but they simplify and sensationalize it in order to make the news attractive to their public (Joffe, 2003). Despite of the fact that today's newspapers are loaded with fear appeals simply because it is

newsworthy, it does not necessarily raise the anxiety in the audience (Washer & Joffe, 2006). As Washer & Joffe (2006) only investigated a part of the social representation of MRSA, the question remains what the public's beliefs and views are. SRT does not offer a way to measure these, it merely describes why and how society constructs social representations (Joffe, 2003).

Bier (2001) reviews many approaches in his study about risk communication to the public, e.g., different categories of risk comparisons, or the use of graphical formats in presenting risk information. These approaches seem to have little systematic impact on the effectiveness of the resulting risk communication. Thus, states Bier (2001), there is no best possible format; the best risk comparison may not be satisfactory to guarantee the efficacy of the message for its target group. Bier (2001) demonstrates that because of individual differences in both attitudes and knowledge about risks, there may be no one-size-fits-all approach. Therefore, underlines Bier (2001), it is important to understand people's mental models, to develop effective risk communication messages and help lay people understand complex or unfamiliar phenomena.

According to Johnson-Laird (1983), human beings understand the world by constructing working models of it in their minds, and when cognitive scientists aim to understand the human mind, they have to construct a working model themselves. Thus, mental models are representations of reality, which people seem to need to understand certain phenomena. In relation to MRSA, the mental models of lay people should be determined in order to create effective risk communication, because people have mostly some relevant beliefs, also concerning MRSA, which they will use to understand risk communication and to link this information to their existing mental model. Risk communication concerning MRSA would be processed incorrectly when it does not match the beliefs the general public has concerning MRSA, because then the public cannot connect the presented information to their existing beliefs.

1.4 MENTAL MODELS APPROACH

As can be concluded from the aforementioned, Mental Models appear to be the keyword in investigating lay people's beliefs and views concerning MRSA. Mental models are much more than only beliefs and views. They include relevant beliefs and knowledge, evoke associations, reveal misconceptions and are continuously subject to changes as people gather more information which they use to construct and rebuild their mental models (Granger Morgan et al., 2001). Mental models generate a much broader view on the place MRSA is given in the life of lay people and why it takes this position, so the method is more complete than any other method and that is why it is rather useful to this study.

Granger Morgan et al., (2001) noted a lack of systematic procedures in determining what people know and need to know, and for demonstrating empirically the efficacy of

communication. As an answer to this deficit, Bostrom, Fischhoff & Granger Morgan (1992) developed a general method for studying risk perceptions of lay people, before generating risk communication strategies. This decision-analytic framework, called the Mental Models Approach, consists out of a number of procedures, which have to be completed, one by one, in order to establish mental models, on which risk communication can be based, successfully (Bostrom, et al., 1992). The method is rather practical and plain, despite of the difficulties posed by the subject and each procedure; every stage generates its own troubles (Byram, Fischhoff, Embrey, Bruine de Bruin & Thorne, 2001). The procedures involved in this method exist out of five steps.

First of all, one needs to create an expert model, which includes relevant scientific knowledge about the risk of interest. This knowledge encloses information about the nature and magnitude of the risk (Granger Morgan, et al., 2001). Step 2 involves conducting open-ended interviews in order to elicit people's beliefs about the hazard, which people can describe in their own words. According to Granger Morgan et al. (2001, this approach allows a way of interviewing the expression of both correct and incorrect beliefs. The interview scheme is based on the expert model, created in step 1. Step 3 comprises conducting structured interviews, also called confirmatory questionnaires, originating the open-ended interviews taken in step 2. The structured interviews deal with both correct and incorrect beliefs about the risk, in order to estimate the population prevalence of these beliefs (Granger Morgan et al. 2001). Step 4 and 5 contain drafting risk communication and evaluating this risk communication. These steps will not be taken into account in this investigation, as the goal is to reveal mental models of the Dutch public and not to develop the risk communication, which can be done in a following study.

Main goal of the Mental Model Approach is to find the knowledge gaps between experts and lay mental models in order to be able to close these gaps with communication providing the specific missing information and replace misconceptions with correct information (Fischhoff, Downs & Bruine de Bruin, 1998). Bostrom, Atman, Fischhof & Granger Morgan (1994) believe that the method provides a systematic way to identify and avoid pitfalls like, e.g. poorly structured or superfluous risk information that bore people and frustrate their attempts to understand what is really important.

The Mental Model Approach distinguishes itself from other approaches because it attempts to cover both scientific and individual truths which are both crucial in developing successful risk communication strategies (Byram, et al., 2001). The distinction between lay and expert knowledge constructs the foundation for creating focused communications. This method allows for the possibility that lay people hold information that the experts do not have so gaps between expert and lay people knowledge can be identified, as can be misconceptions. Lay people may interpret the problem differently than the community of experts does (Byram et al., 2001). The method has been used for several years, for a diversity

of subjects in which lay people had to understand difficult matter in order to make informed decisions concerning their health, safety, and environment, e.g., radon, (Bostrom, et al., 1992) breast implants (Byram et al., 2001), transmission deregulation (Gregory, Fischhof, Thorne & Butte, 2003), disease inherintance, (Henderson & Maguire, 2000) and global climate change (Read, Bostrom, Granger Morgan, Fischhof & Smuts, 1994).

1.5 RESEARCH QUESTIONS

This research is aimed at revealing the knowledge of the general Dutch public concerning MRSA, so recommendations can be done about what information future risk communication, regarding MRSA, should comprise. Therefore, the following main and sub research questions have been formulated.

Main research question;
'What are the existing beliefs of the general Dutch public concerning MRSA and what risk information suits these beliefs best?'

Sub questions;

1. What is the mental model of the general Dutch public regarding MRSA?
2. To which extent does the lay mental model differ from the expert model?
3. What information does fit the existing beliefs and knowledge of the Dutch people concerning MRSA?

1.6 PREVIEW ON THE CONTENT

Chapter two, three and four will cover the three different elements of the chosen method, each chapter ending with the results of that specific part. Chapter five will discuss the conclusions and recommendations based on the results of chapter two, three and four. Chapter six comprises the discussion; the value of this research for science, the limitations of this study, as well as the suggestions for future research.

2 EXPERT MODEL

The Mental Model Approach of Granger Morgan et al. (2001) starts with creating an expert model. This chapter will handle the development of this model. First of all, the method will be illustrated, and then relevant scientific knowledge regarding MRSA will be presented, which creates a base for the model. The procedure concerning the development this model will be discussed next and the chapter concludes with the introduction of the model, including all relevant scientific knowledge available for MRSA.

2.1 METHOD

Creating an expert model can be a complex, creative procedure, according to Granger Morgan et al. (2001) which forces the participating experts to reflect systematically on the structure of their domain. Mental models are developed by using influence diagrams, which can be applied to almost all risks, and which are compatible with the experts' conventional way of thinking, easily understood, readily subjected to peer review, and fit with a decision-making perspective, explain Granger Morgan et al. (2001). In an influence diagram, variables are represented by nodes, and an arrow between nodes shows whether there is some connection between the variables. A cluster of variables on a common topic is sometimes combined in a node to simplify the representation and facilitate expert review of its content according to Byram et al. (2001). Relevant scientific risk information should be summarized by the influence diagram. Granger Morgan et al. (2001) state, that the process of converting scientific information into the diagram is an iterative one. This means that the model has to be revised a number of times before its appearance is satisfying. There are several methods of translating relevant scientific knowledge into an expert model. Granger Morgan et al. (2001) distinguish four methods; the assembly method, in which all relevant factors are listed and then is figured out how they are related; the materials/energy balance method, in which risk is assumed to be created by exposure to particular materials, e.g. lead, so then the expert model becomes a review of the factors affecting the amount of the material available to human contact; the scenario method, in which a risk is explained as a causal sequence of events; and the template method, in which the model is constructed along related structures that are present in risk processes, like e.g., risk factors, consequences, etc.

2.1.1 Procedure

The development of the expert mental model started with collecting relevant scientific knowledge on MRSA which was reviewed and summarized. This was done by searching literature on the topic, in various (online) databases, documents of leading health

institutions, e.g., the Health Council of the Netherlands and Centers for Disease Control and Prevention [CDC], and by analyzing the references of suitable literature. The relevance of the literature was determined by recentness, source, cross references and deliberation.

Then, according to a combination of the assembly and the template method of Granger Morgan et al. (2001), the gathered information was listed (assembly) along structures that are similar for many health threats, like prevention and risk factors (template). These structures were found by analyzing literature on MRSA, health threats in general and previous designed expert models, found in literature on mental models and the examples of Granger Morgan et al. (2001). The different connections between the structures were figured out, just like the relations between the variables. Gradually, a representation of the relevant scientific knowledge appeared, which was produced by using AutoCAD LT2004, a programme meant to create technical drawings, but which turned out to be quite suitable to draw the expert model. The model was revised several times, by deliberating of researcher and supervisors. The final diagram was presented to a microbiologist, an expert on MRSA. Some minor adjustments had to be made, according to this microbiologist, in order to achieve a rather good representation of the relevant scientific knowledge concerning MRSA.

2.1.2 Relevant scientific knowledge on MRSA

According to the Werkgroep Infectiepreventie [WIP] (2005) is Methicillin-resistant Staphylococcus Aureus (MRSA) a bacterium resistant to most common antibiotics, like e.g., methicillin and penicillin. Therefore, the bacterium is difficult to fight. This methicillin insensitivity is caused by the presence of a mecA-gen which makes this type of Staphylococcus Aureus insensitive to all beta-lactam antibiotics. There is also a changing sensitivity to aminoglycosiden and many other antibiotic clusters (WIP, 2005). Zetola, Francis, Nuermberger & Bishai (2005) state, that Staphylococcus Aureus is one of the most successful and adaptable human pathogens, because the bacterium has the remarkable ability to acquire antibiotic-resistance mechanisms and advantageous pathogenic determinants which have lead to its emergence in both nosocomial and community settings. The Centers for Disease Control and Prevention [CDC] (2007) divides MRSA currently in two types; hospital-acquired methicillin-resistant Staphylococcus Aureus (HA-MRSA) and community-acquired methicillin-resistant Staphylococcus Aureus (CA-MRSA). CDC (2007) defines MRSA infections that occur at persons who have not been recently (within the past year) hospitalized or at persons who did not have any medical procedure such as surgery or catheters as CA-MRSA infections.

Below, a summary of the gathered relevant scientific information concerning MRSA can be found. This overview is written along the main structures, found with the template method, suitable for MRSA. These concepts structure the available knowledge on MRSA.

2.1.2.1 Contamination

WIP (2005) distinguishes two ways of MRSA contamination, colonization and infection. First one gets colonized with the bacterium and then, because of the presence of the bacterium in combination with a risk factor, such as open wounds, someone can get infected. People who are colonized can transfer the bacteria but are not (yet) infected. According to Alekshun & Levy (2006), colonization is often a function of age or the status of a person's immune system and a common foreword of disease. According to the National Institute for Public Health and the Environment [RIVM] (2007), one third of all people are colonized with Staphylococcus Aureus and in Holland, one percent of these Staphylococcus Aureus bacteria is methicillin-resistant. That implies a prevalence of 1% of MRSA in the Netherlands.

People that are infected can also transfer the bacterium. Sista, Oda, & Barr (2004) emphasize that it is crucial to determine that a patient is infected rather than colonized with MRSA before the beginning of systematic antibiotics treatment, to reduce the risk of MRSA organisms developing further resistance.

Annually, in Dutch hospitals, MRSA contamination is determined at about 1500 people, which is, in comparison to foreign countries, a very low incidence (RIVM, 2007). When two or more hospitalized patients are contaminated with the same MRSA, the requirements of an epidemic are met (WIP, 2005). To enhance the insights in the epidemiology of MRSA the RIVM performs MRSA surveillance and prevalence and incidence registration. Therefore, from every patient or healthcare worker on whom is found MRSA, an isolate is send to the RIVM (WIP, 2005).

In the expert model a construct called 'contamination' will be included, together with the nodes 'colonization' and 'infection' to reproduce the knowledge of MRSA contamination mentioned above. A node named 'RIVM,' connected with the construct 'contamination,' will reflect the prevalence and incidence registration concerning MRSA contamination, done by the RIVM.

2.1.2.2 Prevention

Policies to prevent MRSA from spreading differ enormously between countries. Some countries leave it to the individual hospitals, whereas the Netherlands pursues a strict policy with explicit national guidelines (Health Council of the Netherlands, 2006). Casewell (1995) found that, despite of the abundance of epidemiological expertise in many countries, few infection control teams are able to handle the essential patient data that they accrue in order to record the success or failure of the MRSA control measure that they are implementing. Such information is becoming essential because it explains the cost of MRSA infection control and offers evidence to the management, and to the public, that the problem is controlled or getting better (Casewell, 1995). Concrete prevention strategies that

can be taken to avoid, decrease and control MRSA will be discussed next. These strategies include different precautions for HA-MRSA and CA-MRSA. Prevention measures that apply to CA-MRSA also apply to HA-MRSA, but not the other way around.

Cleaning the hands is one of the most important precautions that can be taken. According to Henderson (2006), the underlying principle of cautious adherence to hand hygiene guidelines is that most nosocomial patient-to-patient spread of MRSA takes place via the hands of healthcare workers. Therefore, hand decontamination should happen after each contact with patients' intact or non-intact skin, body fluids, excretions, or mucous membranes, after contact with objects or medical equipment in the surrounding area of patients; and after removing gloves (Henderson, 2006). CDC (2007) prescribes all healthcare workers should wear gloves, a mask, including eye protection, and a gown. Used patient-care equipment and laundry should be handled correctly. It is possible that such items are soiled with blood, body fluids, secretions and excretions which can transmit MRSA to other patients (CDC, 2007).

Outside healthcare facilities one should practice good hygiene to avoid MRSA. As told before, hand hygiene is an important precaution which also applies to CA-MRSA. People should keep their hands clean, but also cover cuts and scrapes with a bandage to keep the wounds clean, avoid contact with other people's wounds or bandages, and avoid sharing personal items, like towels (CDC, 2007).

In the expert model a construct called 'prevention' will be included to cover this topic. Several nodes containing specific hygiene measures will complete the construct, namely; 'gloving,' 'cleaning the hands,' 'masking,' 'gown,' 'appropriate device and laundry handling,' 'covering up wounds,' and 'avoid sharing personal items.' To distinguish the hygiene measures taken in case of HA-MRSA and CA-MRSA, the construct will be divided by a dotted line, one half will be linked to HA-MRSA and one to CA-MRSA. Precautions taken in both cases of MRSA will be drawn on the dotted line.

2.1.2.3 Reservoir

Infected or colonized people are the most obvious reservoirs of MRSA in hospitals according to CDC (2007), although personnel can also serve as reservoirs for MRSA; they may harbour the organism for a long time. However, hospital personnel are in general more considered as a link for transmission between colonized or infected patients, because they treat both colonized and infected patients (CDC, 2007). The Health Council of the Netherlands (2006) warns that a nursing home can serve as a potential location for MRSA to establish and spread itself. In a nursing home mostly weakened and often co-morbid patients are situated, which results in intensive nursing and caring. As a consequence of their co-morbidity these patients visit hospitals relatively frequently. When a nursing home resident is colonized with MRSA, it is expected for MRSA to spread easily in this environment to other

patients and the hospital. Therefore screening of nursing home patients before entering the hospital is essential, underlines the Health Council of the Netherlands (2006).

MRSA reservoirs can be found at several places on the bodies of infected or colonized patients, especially on hair, skin and the mucous membranes in the nose, pharynx and intestines (Health Council of the Netherlands, 2006; CDC, 2007). MRSA can also be found in the blood, so practically everywhere, underlines the Landelijke Coördinatiestructuur Infectieziektebestrijding [LCI] (2005). According to Lines (2006), an essential measure in controlling the spread of MRSA in colonized patients is the elimination of nasal carriage. Disinfection measures to avoid the spread of MRSA therefore have to be taken. Disinfection measures involve skin, hair, and nose disinfection. The nose, for example, can be disinfected with mupirocine cream, hair and skin with povidon-jodium shampoo or chloorhexidine-soapsolution. Disinfection of colonized patients can only be meaningful if the patient has got no infections, wounds or skin deviations, like eczema, anymore (WIP, 2005).

In the expert model the theory discussed above will be included by adding a construct named, reservoir. This construct will contain several nodes explaining where to find MRSA on the body. These nodes are blood, hair, skin/wounds and mucous membranes. Mucous membranes will be divided into mouth/pharynx, faeces and nose, to name the mucous membranes more specific. In the literature covering reservoirs, it is mentioned that infected or colonized people can serve as reservoirs of MRSA, but it is chosen to include the exact spots of MRSA on the body, because that is where MRSA is likely to be found, if someone is infected or colonized.

Disinfection measures, taken to eliminate MRSA carriage, will be put in the expert model by adding a node 'disinfection measures' and connecting this node to the specific measures taken, namely; nose cream, and shampoo. In fact, these nodes belong to the construct treatment, but they are also closely related to avoiding spread and reservoir. They are brought up in this section because of continuity reasons.

2.1.2.4 Spread

The transfer of MRSA takes place through direct contact, air, and environment (Health Council of the Netherlands, 2006). MRSA is transmitted most frequently by direct skin-to-skin contact. CDC (2007) claims, that the main mode of transmission of MRSA is via hands, mainly through the hands of healthcare workers, which may become contaminated by contact with colonized or infected patients, or contact with contaminated body parts of the personnel themselves, or by touching devices, items or environmental surfaces covered with contaminated body fluids. Henderson (2006) confirms that failure to perform appropriate hand hygiene is generally considered to be the leading cause of healthcare-associated infections and spread of multi resistant organisms like MRSA. As can be seen, a great deal of

the spreading occurs through colonized people and surroundings, which is why the fight against MRSA must not be limited to infected patients (WIP, 2005).

Another possibility for MRSA to spread is a mutation of Methicillin Sensitive Staphylococcus Aureus (MSSA). Methicillin resistance occurs when the so-called mecA-gen is acquired, which results in decreased sensitivity for different types of penicillin and other kinds of antibiotics (Health Council of the Netherlands, 2006).

All possible spread options will be reproduced in the construct 'spread.' The nodes that will complete this issue are 'direct contact,' 'air,' and 'environment,' which belong to 'transfer.' Furthermore, the necessity of avoiding spread will be emphasized by adding the node 'avoid spread,' and the risk of mutation of MSSA will be underlined with the node 'mutation MSSA.'

2.1.2.5 Consequences

When infected with MRSA, the bacteria can cause several infections. Staphylococcus Aureus or MRSA infections in society are usually apparent as skin infections, such as pimples and boils, and occur in normally healthy persons, according to CDC (2007). MRSA in healthcare settings commonly causes serious and potentially life threatening infections, such as bloodstream infections, surgical site infections, or pneumonia (Health Council of the Netherlands, 2006). Sista et al. (2004) draw attention to the fact that MRSA is becoming an increasingly regular cause of the so-called ventilator-associated pneumonia in ICU patients. Other infections that occur are heart and bone infections (Health Council of the Netherlands, 2006), but also urinary tract infections (CDC, 2007).

A construct named 'consequences' will cover the topic discussed above. In this construct seven nodes will be added, reflecting the possible consequences of MRSA. These nodes will be; 'pneumonia,' 'urinary tract infections,' 'wound infections,' 'sepsis/ death,' 'bone infection,' 'endocarditis,' and 'skin infections/boils.'

2.1.2.6 Risk factors

MRSA appears most frequently among patients who have to undergo invasive medical procedures, like surgery, or who have a weakened immune system and are being treated in hospitals and healthcare facilities such as nursing homes and dialysis centres (CDC, 2007). Hospitals and nursing homes are risk factors because of all the present bacteria. CA-MRSA has been associated with poor hygiene, crowded living conditions, skin-to-skin contact and openings in the skin such as cuts or abrasions (CDC, 2007). Recent hospitalization abroad increases the risk as well as skin problems (WIP, 2005). The introduction of day surgery and other day treatments for uncomplicated operations and disorders available in policlinics appear to leave the hospital a patient population which has more serious underlying diseases and therefore more risk factors for hospital-acquired MRSA infections (Casewell, 1995).

All risk factors named above, will be summarized in the expert model under the construct 'risk factors.' This will include the nodes; 'recent hospitalization abroad,' 'invasive medical procedures/surgery,' 'weakened immune system,' 'wounds,' 'skin problems,' 'poor hygiene,' 'crowded living conditions,' 'frequent body contact,' 'hospitals,' and 'nursing homes.'

2.1.2.7 Origin

In order to gain insights in the way MRSA contamination spreads, it is important to know if MRSA is caught at a hospital, nursing home or in the community (Health Council of the Netherlands, 2006). In other words, it is important to establish the origin of the MRSA to make sure the right precautions are taken. According to Zetola et al. (2005), nosocomial colonization with MRSA goes frequently unnoticed and may therefore lead to an infection months after hospital discharge. Then it may be difficult to establish the origin of strains causing MRSA infections in the community and the MRSA be considered incorrectly as CA-MRSA. This difficulty in differentiating hospital-acquired MRSA from community-acquired MRSA has led to confusion concerning the prevalence of MRSA in the community, state Zetola et al. (2005). The reverse is also true as community-acquired MRSA strains have spread into the hospital. Therefore, differentiating between what is a typical nosocomial MRSA strain versus an emerging community-acquired MRSA strain is becoming very difficult, claim Zetola et al. (2005). Abb (2004) demonstrates that the majority of MRSA isolates are sporadic strains, which are most probably continuously introduced through inter-hospital exchange of patients or staff migration. It seems that in future it may become impossible to distinguish CA-MRSA from HA-MRSA each other, as its strains are evolving and entwining, as we speak.

In the summer of 2005, MRSA contamination was detected at a farm in the Netherlands. Investigation showed that MRSA was transferred from pigs to human. People who work with pigs and also cows have to take special precautions in order to avoid MRSA (Health Council of the Netherlands, 2006). In this case the origin of MRSA is unclear.

The origin of MRSA is comprised in the expert model under the construct 'origin.' Several nodes will summarize the relevant literature on this topic, namely; 'hospital,' 'nursing home,' 'community,' and 'unknown.' A node referring to the possibility of MRSA contamination through animals will be placed outside the construct, as in this case the origin is unknown. This node will also be linked to 'transfer.' Since it is important to know the origin of MRSA, in order to take the right precautions, a node will be placed outside the construct origin.

2.1.2.8 Treatment

Treatment of MRSA infected patients is difficult. Bagger, Zindrou & Taylor (2006) found that patients with an MRSA infection had a higher mortality rate and a longer hospital stay

than patients with no such infection. Keyword in the treatment of infections is time. The sooner the treatment starts, the better, because it reduces the mortality rate. Logically, the later the treatment starts the higher the mortality and the longer the hospital stay (Health Council of the Netherlands, 2006). Treatment of colonized patients is aimed at avoiding the spread of MRSA and at decolonizing the patient so the possible negative consequences for the patient's health are eliminated (Health Council of the Netherlands, 2006). A common taken measure to avoid the spread of MRSA is isolation for both infected and colonized patients (WIP, 2005).

Alekshun & Levy (2006) describe two approaches to protect from infection and / or to control infection by disease-causing organisms: antibiotics and vaccines. Vaccines promote the creation of unique ecological niches that can be occupied by organisms not subject to the vaccine and may lead to immunologically unreactive disease-causing variants, according to Alekshun & Levy (2006). This is highly undesirable in the case of MRSA as it requires continuous microbiology monitoring. Fighting MRSA should therefore rely on antibiotics. Antibiotics inhibit growth of both beneficial and harmful bacteria while vaccines are more selective and less disruptive microbiologically, according to them. Both types of therapies alter the microbial flora of the human body, state Alekshun & Levy (2006), but antibiotics have an immediate short-lived effect on microbial growth, while vaccines deliver their benefits slower, but more persistent. The number of antimicrobial agents available for the treatment of MRSA infections is limited, declare Sista et al. (2004). In the present treatment of MRSA infections the following antibiotics are included according to Sista et al. (2004); vancomycin, dalfopristin-quinupristin, linezolid, and trimethoprim-sulfamethoxazole. Since CA-MRSA have now acquired resistance to other antibiotics, some of the few remaining choices for oral therapy of MRSA infections are clindamycin, linezolid, and minocycline (in some circumstances), according to Sista et al. (2004), but they underline that vancomycin remains the drug of choice for the treatment of MRSA infections.

Given the limited antibiotic choices for treating MRSA, Sista et al. (2004) suggest that the best strategy for reducing the incidence of infection is by (1) limiting antibiotic use as widespread use of antibiotics has clearly contributed to the development and spread of MRSA infections, and (2) by preventing horizontal transmission of MRSA between patients. In time it might happen that MRSA also gets resistant to vancomycin. That would increase the mortality because of the limited other available treatments. Development of new antibiotics will take years according to the Health Council of the Netherlands (2006), as few new antibiotics are approved in the last years.

Zetola et al. (2005) state, that the increasing prevalence of CA-MRSA in multiple countries and the substantial morbidity and mortality associated with these infections suggest that CA-MRSA will continue to develop into a challenging public-health problem.

In the expert model, the above mentioned, will be referred to as the construct 'treatment.' This construct will cover the treatment of both colonized and infected patients, which will be made clear by two separate nodes; 'treatment of infected,' and 'treatment of colonized.' Treatment options suitable for both types of patients will be linked to the construct 'contamination.' Other nodes that will be added are; 'extended hospitalization,' 'isolation,' 'directed antibiotics,' 'timely treatment,' which will be linked to 'low mortality rate,' 'wrong antibiotics,' 'no new antibiotic available,' 'delayed treatment,' which will be linked to 'increased mortality rate,' and 'extended recovery period.'

2.1.3 Adjustments based on expert counselling

Discussing the expert model with Ron Hendrix, medical microbiologist of Medisch Spectrum Enschede and Laboratorium Microbiologie Twente Achterhoek, resulted in some minor adjustments. To the construct prevention two aspects were added, namely; 'disinfection of hands with alcohol' and 'appropriate handling of garbage.' 'Avoid contact with wounds of other persons' was changed into 'avoid contact with MRSA-positive persons.'

Concerning the concept reservoir, some modifications had to be made, 'intestines' had to be changed into 'faeces,' pharynx was completed with mouth to underline the role of saliva, and to the aspect skin, wounds were included. Wounds are usually on the skin, but MRSA is present in wounds too. Some extra aspects were put in the model, namely; 'surfaces,' because MRSA can be found on all kinds of surfaces, and 'animals,' in which MRSA can also be present.

To the subject spread 'surfaces' and 'needles' were inserted, as the spread of MRSA also occurs through these means. When needles are not cleaned appropriately, they may serve as a transmitter. The same is true for surfaces, as all surfaces may be contaminated with MRSA. The aspect 'direct contact' was extended with 'hands,' as hands are the most common means of transferring MRSA.

The origin of MRSA was completed with the aspect 'foreign countries.' The Netherlands have a strict policy concerning MRSA, but foreign countries do not have those strict policies. Therefore, MRSA, occurring in the Netherlands, may be originated abroad.

The construct risk factors was extended with 'use of antibiotics,' 'sport teams,' and 'unhealthy lifestyle.' When using antibiotics, one mostly had a weakened immune system, but it also increases the risk of bacteria acquiring more resistance. Sport teams enlarge the risk of intensive body contact and the possible exchange of body fluids, through wounds or perspiration. Unhealthy lifestyle may permanently decrease the immune system and expose one to other risk factors. 'Skin-to-skin contact' was better represented by 'frequent body contact,' and therefore adjusted.

The consequences of MRSA were adapted by just changing some terms. 'Bloodstream infections' were renamed 'sepsis / death,' 'heart infection' was changed into 'endocarditis,' and 'skin infections' were extended with 'boils.'

Other adjustments, which did relate to treatment and some nodes not fitting into a construct, were; 'development of new antibiotics is time consuming,' which was changed into 'no new antibiotics available,' besides, the node 'little treatment options left' was deleted. The aspect concerning 'vancomycin resistant MRSA' was transformed into 'wrong antibiotics,' and 'vancomycin infusion' became 'directed antibiotics.' An arrow was inserted from 'increased mortality rate' to 'extended recovery period.' A new node, also called directed antibiotics, was added to treatment of colonized patients, including an arrow, as colonized people are sometimes also treated with antibiotics, but the other node called 'directed antibiotics' was impossible to link with 'treatment of colonized patients.' The last node to be extended was 'pigs / calves,' 'pets' were added to this node.

When making these adjustments to the expert model, Ron Hendrix agreed with approving the model. The final expert model can be found in appendix 1, figure 1.

2.2 RESULTS

All scientific information completed with the comments of the medical microbiologist resulted eventually in an expert model. The characteristics of the influence diagram will be covered in this part. The expert model, figure 1, can be found in appendix 1.

The structure, in which the relevant scientific knowledge was summarized, was used to design the influence diagram. Therefore, the expert model consisted out of eight constructs (prevention, spread, contamination, reservoir, consequences, risk factors, origin and treatment), which were composed by quadrangles, drawn around grouped nodes, in which the relevant factors, belonging to that particular construct, were ordered. This was also done to increase the general view of the influence diagram. As most people start reading on the left, the left upper corner is the part, were the model starts. The right part of the model is not covered by a quadrangle, because it was not possible to group the various relevant factors in that part of the model. Most nodes have something to do with treatment, but as MRSA distinguishes two types of treatment, for colonized and infected people, it was not achievable to put these in one quadrangle because of the lay-out of the influence diagram. The model would have become too complicated with all the arrows. Some nodes are present in two quadrangles, because they fit into both, like hospital. Being in the hospital is a risk factor for acquiring MRSA, but it is also an origin of MRSA. In order to avoid nodes being doubled, to improve the outline of the expert model, the quadrangles are partly put over each other. Concerning prevention measures for hospital-acquired and community-acquired MRSA, this concept of the model is divided by a small dotted line, because they share the item 'hand washing' but in general the measures used in case of CA-MRSA are also used for

HA-MRSA, but not the other way around. Instead of arrows to indicate connections, only lines are used to indicate these connections, as some connections are reciprocal and this would result in too many arrows, which would make the model rather complex.

3 MENTAL MODELS INTERVIEWS

In this chapter will be dealt with the second step of the Mental Model Approach of Granger Morgan et al. (2001); the design and conduction of the mental models interviews. First, the method will be illustrated and then the development of the interview scheme, used to guide the interviews, will be discussed. Then the pre-test of the interview scheme will be handled. The methods' section will conclude with the procedure used to conduct the interviews and converting the data into a mental model and the characteristics of the participants. The paragraph results will comprise the expert model with added non-expert beliefs.

3.1 METHOD

According to Granger Morgan et al. (2001), the main objective of the mental model interviews is to get people to talk as much as possible about how they think about, in this case MRSA, while imposing as little as possible about other people's ideas, perspectives, and terminology. Granger Morgan et al. (2001) developed a procedure they call a 'funnel' design. This procedure starts with very general questions and ends with rather focused questions, in order to run as little risk as possible of putting ideas in the head of the participants. Towards the end of their interview protocol more focused questions are asked, to pick up beliefs that might otherwise have been lost, but with a risk of suggesting beliefs or stimulate their creation. The middle part of the interview is devoted to bringing up the constructs of the expert model to correct oversights (Granger Morgan et al., 2001).

The mental model method of Granger Morgan et al. (2001) uses semi-structured, open-ended interviews that focus respondents' attention on scientifically relevant issues, while allowing them to utter their beliefs without restraint and in their own language. It is also a precondition for creating closed-form questionnaires that could be administered more efficiently to a large sample, than in-depth interviews, cause without initially casting so open a net, researchers cannot know the full range of lay persons' misconceptions and concerns or even the terms in which accurate beliefs are intuitively formulated (Byram et al., 2001). Therefore, the first step in the mental models interview is developing an interview scheme that can serve as a detailed guide throughout the interviews.

Conducting the interviews requires a lot from the interrogator, as the interview has to appear conversational and the respondents have to be kept involved with the subject that may be unknown and difficult to them, without putting ideas in the head of the respondent (Granger Morgan et al., 2001). Therefore, the interview should be recorded and transcribed verbatim. Ideally, the interviewer should practice and pre-test the interview scheme before

starting the real job, in order to avoid pitfalls concerning the scheme and the conversation (Granger Morgan et al., 2001).

The data provided by the interviews can be presented in several ways. According to Granger Morgan et al. (2001), the results of the interviews can be very extensive and feel quite overwhelming, therefore, they offer five ways of presenting the data. Exhibit 1 presents the data in stages by organizing the data along a basic structure and continuing by adding detail; Exhibit 2 constructs mental models of a few individual subjects along the expert model, completed with the statements corresponding to each node; Exhibit 3 reproduces the expert model with added non-expert beliefs, highlighting the frequency of each node mentioned by the respondents; Exhibit 4 shows the expert model, with added non-expert nodes and the frequency of each node mentioned by the interviewer in a particular interview; Exhibit 5 provides a collection of the statements associated with important nodes in the expert model (Granger Morgan et al., 2001) The results of the mental model interviews about MRSA will be presented along exhibit number 3 of Granger Morgan et al. (2001), in which the expert model, as created in chapter 2, will be completed with non-expert beliefs, along with the frequency with which each node is mentioned. This exhibit provides a well-organized overview; at once can be seen where people's beliefs are concentrated and which non-expert beliefs have emerged from the interviews.

The participants of the mental model interviews should ideally represent the target group and be chosen randomly, according to Granger Morgan et al. (2001). The sample size of the interviews depends on the desired level of precision, state Granger Morgan et al. (2001), however after about 15 interviews, very few new concepts arise and somewhere around 20 interviews an asymptote is approached.

3.1.1 Interview scheme

Examples of interview schemes of Granger Morgan et al. (2001) were used as basis for the interview scheme developed for determining the mental models concerning MRSA. This interview scheme can be found in appendix 2.

The first page of the questionnaire contained some demographic questions, such as age, gender, level of education, and nationality of oneself and their parents, in order to be able to obtain a representative sample of the population.

The opening question of the interview was: 'Did you ever hear about MRSA? Please, can you tell me something about it?' When the participants did not remember anything about MRSA, one was told that MRSA was also called the hospital bacterium. If this did not ring a bell either, the interrogator told that MRSA might be a health risk for people who have it. Non-judgemental basic prompts, used to keep the conversation going were: 'Anything else?,' 'Can you tell me more?,' 'Do not worry about whether it is right, just tell me what comes to mind,' and 'Can you explain why?' In other words, it was intended to evoke recall

of MRSA in the first place, but when this failed, it was tried to evoke recognition by prompting the respondents with cues to help them retrieve their knowledge on MRSA.

The interview scheme continued with all the topics handled in the expert model (contamination, prevention, reservoir, spread, consequences, origin, risk factors, and treatment). These topics were brought up if the respondent did not bring them up during the interview. The sentences marked with an asterisk were only brought up if the respondent himself mentioned the topic.

The last part of the interview scheme covered topics concerning risk perception and management, risk comparisons and personal risk, in order to elicit more beliefs and ideas about MRSA. These questions were brought up with any participant.

3.1.2 Pre-test

The interview scheme was pre-tested among two participants, in order to get bugs fixed. The participants were 23 and 44 years old, one male, one female, with an education level of respectively HBO and VMBO, both having a Dutch nationality. The interview was recorded and transcribed. The transcripts were reviewed to check whether they followed the interview scheme, if all opportunities for follow-up questions were identified and used, and to control if the basic prompts and other remarks of the interviewer were not suggestive.

It turned out that the interview scheme was quite sufficient. Only the first general question, to stimulate the respondents to talk, and the last questions about risk perception, risk comparison and personal risk were asked according the interview scheme. The middle part of the interview, concerning the concepts of the expert model, did not really follow the interview scheme, as the participants jumped from one subject to another. The participants appeared not to know much about the subject that is probably why the average length of the interviews was only ten minutes. The participants were simply done talking after that time, and pressing them would only have resulted in them making things up, in order to be able to give a response, because the participants really wanted to say something. The recording of the interview might have influenced this, as one person got rather suspicious of the voice recorder, by looking at it and saying ‘cut this part out the recording please.’ This might have been the same for the other participant. Afterwards, the respondents could ask questions about the subject and it seemed that they talked more freely without being recorded.

Overall, the interview scheme was satisfying and the conversations went pretty well, although, the interviewer had to be very careful not to keep asking ‘please, tell something more’ or ‘what about the risk factors concerning MRSA?’ in order not to let people make things up, just to give an answer.

3.1.3 Procedure

In order to obtain a diverse sample, representative for the Dutch population, it was decided to walk across the streets of a city (Leeuwarden) and a village (Surhuisterveen) both situated in Friesland, and then ask people if they wanted to join an interview. When people agreed to join the interview, the first question was whether or not they had problems with recording the interview. When consenting with the recording, the interview started. Afterwards all raised questions about MRSA, of the participants were answered. All interviews were done by the same interviewer and lasted from five up to twenty minutes, with an average of twelve minutes.

The data provided by the interviews was structured according to a coding scheme, in which the constructs and the various aspects per construct could be found. The non-expert concepts (concepts not mentioned in the expert model), raised in the interviews, were sorted along four categories, namely; misconceptions, peripheral beliefs (correct but irrelevant to the risk, although not to the respondent), indiscriminate beliefs (correct but not specific enough), and background beliefs (too basic to be named in the expert model) (Granger Morgan et al., 2001). The coding of the statements along the scheme was done by three independent judges. Disagreements, quite a few, were solved by discussion. Both, the expert beliefs and the non-expert beliefs were presented in the expert model, according exhibit 3 of Granger Morgan et al. (2001). The frequency of each mentioned node was calculated per respondent (N=17).

3.1.4 Respondents

The sample size consisted out of 17 participants of which 9 were male and 8 were female. The mean age of the respondents was 47,65 years, with a minimum of 20 and a maximum of 81 years. The standard deviation was 20,44 years. All participants had a Dutch nationality; of only one participant the parents had a Moroccan nationality.

The education level of the participants varied between elementary school and university. Three persons only completed elementary school, whereas high school (VMBO, HAVO & VWO) was completed by two persons. Profession education (MBO, HBO & University) was finished by twelve participants. All respondents were residents of Friesland, a province in the north of the Netherlands.

3.2 RESULTS

The results of the open-ended interviews will be handled below. First the raised non-expert beliefs will be addressed, as they are mainly the answer to the first question of the interview 'please tell me about MRSA.' The frequencies of the non-expert concepts are not described, because the sample was very small and the non-expert concepts diverse. All raised concepts were worth investigating; therefore all were included in the confirmatory

questionnaire, conducted during the next phase, which can be found in the next chapter. Then, the brought up nodes of the expert model will be discussed, along with their frequencies. The results of the open-ended interviews are visualized in the expert model presented in the previous chapter, completed with the non-expert beliefs, which can be found in appendix 3, figure 2.

3.2.1 Non-expert beliefs

In the model, some non-expert beliefs were drawn on the left side, some inside the expert model, all with an interrupted line. The non-expert beliefs were grouped according 'what is it,' 'who acquires it,' and 'what causes it,' because the participants tended to tell about MRSA in this way. Six non-expert concepts were brought up by the participants when telling about MRSA. Muscular disease and immunity disorder are examples of the far-fetched meanings assigned to the term MRSA, as was mouse arm, which was even named several times. More close relating ideas of the participants were; contagious virus, which is wrong, because MRSA is a bacterium, illness, which is wrong because MRSA can cause an infection and therefore one may become ill, but it is not an illness itself. One person named MRSA a tropical disease, and thought that it would be transferred by insect bites.

Five possible victims of MRSA were distinguished, namely; children, elderly, addicts, unkempt people / tramps and foreign nations. Children and elderly were supposed to be victims, because they were associated with weakened immune systems. The participants seemed to overlook naming people with weakened immune systems possible victims, but instead of that, it seems that they choose some groups with possibly weakened immune systems, which are usually more often ill, like children and elderly.

Another six causes of MRSA were indicated. The one, who thought addicts, of both drugs and alcohol, would acquire MRSA, accused substance abuse of being the origin. The person, who addressed MRSA to unkempt people / vagabonds, assigned this to an unhealthy lifestyle, which is indeed a risk factor for acquiring MRSA, but not a cause of MRSA infections. Insect bites were named in relation to tropical disease, as were foreign nations being possible victims of MRSA. Some people seemed to be convinced of MRSA having a foreign origin and allocated it to people travelling to countries far away or to immigrants from foreign countries. The persons who related MRSA to a mouse arm, pointed at overburdening being the cause of MRSA.

After revealing to the participants that MRSA is also known as the hospital bacterium, most participants had something to say about MRSA in relation to certain constructs. One is thought to be safe for MRSA, when one uses no drugs or alcohol, and when one is a lot outside. Injection with a vaccine is also thought to prevent from MRSA-colonization. During the interviews, it appeared that good hygiene was not mentioned to prevent from MRSA by some participants, and no specific measures concerning hygiene were mentioned. As a

reservoir of MRSA blood was named, by checking one's blood it was possible to determine if one acquired MRSA, which is a possible option, but not commonly used. To check whether a person is contaminated with MRSA is principally done by testing a sample of the mucous membranes, taken from the nose or the mouth. Some participants thought that one with MRSA was not allowed to leave the hospital as long as one had MRSA. Other people thought one could not undergo surgery when having MRSA, which is partly true, because if the reason for surgery is more life threatening than possible infection with MRSA, the patient will undergo surgery. One thought as well that MRSA started with high fever, like influenza, which is not true, infections may evoke fever, but it certainly does not look like influenza. Some non-expert risk factors were also named in the interviews, like, MRSA being restricted to children, or elderly. Surprisingly, several participants told that MRSA was restricted to hospitals, so when one did not enter a hospital, MRSA would be of no danger. Certain hospitals were thought to be more frequently suspected of MRSA presence than others, by several participants. Some participants added that acquiring MRSA would depend on the person: Some people would get it, and others would not. This is represented in the model by 'genetically determined.'

One person knew more about MRSA, than the others, probably because of his education. This person studied Animal Management. This might have caused some bias.

Overall it seemed that, some people were confused by the abbreviation MRSA, and related it to far-fetched meanings, victims, and causes. Another part of the participants seemed to have heard about MRSA but could not concretely define MRSA and its implications.

3.2.2 Expert beliefs

The expert beliefs named in the interviews are shaded in the expert model and provided with the number of participants that cited them, during the interviews. In the construct prevention, three nodes were named. 'Cleaning hands,' was brought up twice, 'gown' and 'appropriate device handling,' both once. It seemed that people do not have concrete ideas of prevention strategies concerning MRSA.

The concept reservoir was also not well known to the participants of the interview. Only one node was named only once and that is 'skin / wounds.'

The two ways in which MRSA contamination can occur, were not explicitly distinguished by the participants, although 'colonization' was named twice and 'infection' was mentioned three times. However, people referred to 'colonization' as 'carrying MRSA without becoming ill' and 'infection' as 'MRSA causes infections,' it does not appear, that people clearly distinguish between the two types of contamination, because not a single person named both types of contamination during the interview.

The spread of MRSA occurred through 'transfer,' according to three people, two people thought it would spread by 'air,' two thought it would spread through 'direct contact (hands).' 'Calves and pets' were mentioned twice by the participants.

The risk factors of MRSA seemed to be more familiar to the respondents. Even twelve people named 'weakened immune system' as a risk factor of MRSA and eight participants thought that 'invasive procedures / surgery' increased the risk of MRSA. 'Hospital' was mentioned to be a risk factor nine times, and six times to be a possible origin of MRSA. 'Recent hospitalization abroad,' 'poor hygiene' and 'crowded living conditions,' were all named once and 'wounds' was named twice.

Eight persons mentioned 'isolation' to be a treatment procedure for people with MRSA. Only one person told about 'directed antibiotics' in the interview, the same holds for possible 'extended hospitalization.' That administering wrong antibiotics might result in more resistance in MRSA was acknowledged by three persons. Acquiring MRSA might result in an extended recovery period, according to another three persons.

It seemed that the knowledge of the participants of the interview is concentrated around the risk factor construct. This might be because the aspects named in this construct hold for more health threats. If people did not have a clue about MRSA, they might have named general risk factors, which are commonly supposed to cause health problems, like weakened immune system, and therefore it might seem that they were familiar with MRSA, but in fact, they just guessed. Furthermore, it can be said that isolation was a rather familiar treatment to some participants. Overall, it can be seen that, some concepts and aspects were mentioned only a few times, but that the majority was not named in the interviews.

4 CONFIRMATORY QUESTIONNAIRES

According to the Mental Models Approach, the third step, after creating an expert model and conducting interviews, to verify whether the beliefs can be generalized to the population, is designing and conducting confirmatory questionnaires (Granger Morgan et al., 2001). This chapter will deal with the method of developing confirmatory questionnaires, the structure of the questionnaire, the pre-test and the procedure concerning conducting the questionnaires. The chapter ends with the results of the questionnaire and some additional analyses.

4.1 METHOD

The mental model interviews produced a lot of information which was transcribed to closed-form questions. Questionnaires containing closed-form questions can be efficiently administered to a large sample according to Granger Morgan et al. (2001); it allows for investigating the widely shared concepts and misconceptions concerning MRSA, on which effective communication strategies can be built.

In order to create the questionnaire, a list of concepts that had to be covered was constructed based on the expert model and the interview scheme. All concepts of the expert model were included (prevention, spread, contamination, reservoir, consequences, risk factors, origin and treatment) as well as the non-expert beliefs that emerged from the interviews, some demographic variables, the risk perception concerning MRSA and information sources regarding the knowledge and the familiarity of the participants with MRSA.

The closed-form questions were provided with a question format of true-false questions on a five-point scale. True-false questions are compact, contain little information compared with multiple-choice questions, and they easily lend themselves to posing the same question in different forms to allow cross-checks, according to Granger Morgan et al. (2001). The five-point scale was chosen because it was hypothesized that people would not know much about the topic. A two-choice response mode would not allow for the option 'do not know' which was likely to be given. A three-point scale, including the 'do not know' option, would be better, but doubting participants would choose 'do not know' quickly in order to avoid wrong answers. Therefore, the five-point scale was chosen, as the options two 2 = I think this might be true) and four (4 = I think this might be false) allow for a little uncertainty about the answer. For that matter, all answering options were intentionally formulated to leave some space for doubt, in order to avoid all people answering 'do not know' as most people have ideas about the subject, but do not dare to express them.

The developed questionnaire was pre-tested before administering it to the target group. The target group had to consist out of 100-300 people, according to Granger Morgan et al. (2001), as the main goal is to get a reliable impression of the rough prevalence of the key beliefs in the target audience; that should be sufficient.

4.1.1 Questionnaire

The questionnaire consisted out of 83 items split up into three parts, of which part I handled the misconceptions / non-expert beliefs emerged from the interviews, part II covered the expert model, and part III contained items about risk perception, information sources and demographic variables. The questionnaire was split up into three parts, because it turned out to be quite long and because it helps respondents to keep track of the list. The logo of the University of Twente was placed on top of each page, in order to give respondents the feeling that the intention of the questionnaire was trustworthy. The University of Twente is a well-known academic institute in the Netherlands, which may evoke familiarity among the respondents. The final questionnaire can be found in appendix 4.

The questionnaire started with a brief explanation of why the study was conducted, emphasizing that filling in the questionnaire is really important, even when one does not know anything about the subject, and that no wrong answers can be given. Further is told that all answers are kept anonymously, that one has to complete a page before starting on the next page and not to return to the previous page. This was essential as the questionnaire reveals some information about the subject when starting the second part of the list; this information might influence the answers given to earlier questions. The explanation ended with how the questionnaire was organized and an indication of how long it would take to fill in.

As all open-ended interviews started with 'Please, tell me about MRSA,' a question that produced a variety of misconceptions, the idea was to start the questionnaire also with the question 'what is MRSA?' 'MRSA is some kind of muscular disease,' is an example of the propositions posed, covering this topic. Respondents then could rate the misconceptions along a five-point scale (1 = to my best knowledge, this is true, 2 = I think this might be true, 3 = I do not know if this is true or false, 4 = I think this might be false, 5 = to my best knowledge, this is false). Since the participants of the interviews also had different ideas on who could get MRSA, the next question of the questionnaire was 'who gets MRSA?' 'MRSA can be mostly found among addicts,' is an example of the propositions posed covering this topic. Again people could choose rate them along the five-point scale. The same procedure was followed for the last question 'what causes MRSA?' An example of a proposition on this question is 'MRSA can be transmitted by insect bites.' This part of the questionnaire, in which misconceptions concerning MRSA were addressed without giving an explanation about the term MRSA, was called part I. This part contained 17 items, of which six belonged to the question 'what is MRSA?,' five items covered the question 'who gets MRSA?' and another six

questions handled 'what causes MRSA?' The items were preceded by an explanation about the purpose of the propositions and how to fill these in.

During the interviews, people were first asked to tell about MRSA and after they were done talking, the interrogator explained, if necessary, what MRSA was; 'MRSA is also known as the hospital bacterium and MRSA might be a health risk for people who have it.' The participants of the questionnaire had to get the same information, so after addressing the misconceptions, the same explanation was given to them as was given to the participants of the interviews. This was done by putting a frame in a grey shade on top of the page, with the text 'MRSA is also known as the hospital bacterium and MRSA might be a health risk for people who have it.' The respondents then could continue the questionnaire by filling in items covering the expert model combined with some misconceptions that did not fit in the first part, because they did not address one of the three questions, like 'MRSA starts with high fever, just like influenza' but which fitted a concept of the expert model, in this case 'consequences.' The items were formulated as propositions which could be rated according the same five-point scale as used in part I (1 = to my best knowledge, this is true, 2 = I think this might be true, 3 = I do not know if this is true or false, 4 = I think this might be false, 5 = to my best knowledge, this is false). Examples of propositions in this part are 'MRSA can be found at hair,' 'one can be immune to MRSA,' and 'there exist various MRSA treatments.'

This part of the questionnaire was called part II. It included 50 items covering the concepts of the expert model (prevention, spread, contamination, reservoir, consequences, risk factors, origin and treatment). Not every single aspect of the expert model's concepts was covered in the questionnaire. Aspects brought up by the respondents of the interviews, and aspects which were relevant to know, and not too specific for the participants of the questionnaire, according to the researcher and her supervisors, were included. After all, the expert model contained a lot of specific information, which is not necessary to know for the participants. According to Granger Morgan et al. (2001), one may assume that the interviews produce beliefs that are 'out there' with some reasonable frequency. So, if the beliefs did not emerge from the interviews, one may assume that those beliefs are not widely shared, and therefore, they are not necessary to address. It might have unnecessary lengthened the questionnaire, which was already quite long. As a result, this might have caused people to lose their attention and interest, while filling in the list. Thus, it is chosen to strike out all superfluous items, to keep the questionnaire as compact as possible. Overall, it was tried to include items covering each construct of the expert model. Deliberating and discussing the different aspects of the concepts of the expert model with the researcher and her supervisors resulted in a consensus, regarding the questionnaire and the formulation of the propositions. In order to reduce the risk of inference, the items of the different concepts were spread around the questionnaire. The statements of part II were preceded by a short explanation,

telling the respondents to read the text in the grey shaded frame and how to fill in the propositions during this stage.

Part III of the questionnaire started with four risk perception propositions, in order to obtain insight in the risk perception people have concerning MRSA, e.g. 'I think that MRSA is a serious risk to society,' and 'compared to others my personal risk to MRSA is small.' These could be rated according a five-point scale (1 = I totally agree on this proposition, 2 = I partly agree on this proposition, 3 = I do not have an opinion about this proposition, 4 = I partly disagree on this proposition, 5 = I totally disagree on this proposition). Part III continued with questions about where participants got their information about MRSA, to be able to do some recommendations for communication means, and if they had ever heard of MRSA before. Further some questions about the health condition of the participants, familiarity of themselves and their family / friends with MRSA, in order to be able to do some extra analyses whenever desired, and it ended with some demographical questions. Altogether part III comprised 16 items, which were mainly based on the interview scheme, and completed with some questions about health condition and familiarity with MRSA. The items were preceded by a short introduction about how to fill in the questions and in the end there was some space left for participants to write down their comments about the survey.

4.1.2 Pre-test

The questionnaire was pre-tested among nine participants varying from 23 to 52 years old, with a mean age of 35 years. Five participants were male and four female. The level of education ranged from VMBO to university, with four people higher educated and five lower educated. The participants were asked to fill in the questionnaire, to mark every question which did not seem comprehensible and to note every problem they encountered. The time the participants needed to complete the questionnaire was kept up. It varied from 9 till 15 minutes, with a mean time of 12 minutes.

None of the participants had much troubles filling in the questionnaire. One participant was confused by the answering options since they were numbered just like the questions. At first sight, he thought of answering the answering options too, so this was adapted in the final draft of the questionnaire. The lay out of the answering options was changed by putting them in a frame centered on the page. One participant forgot to fill in the perception statements in part III of the questionnaire; maybe these statements did not attract his attention enough. This was solved by putting the answering options in a frame, so that the statements popped up a little more.

Some participants had considerations about negatively formulated questions, because they were more difficult to answer, but it turned out that all participants were able to fill in these questions, so no adjustments were made. All participants were asked if they had

troubles with filling in the questions and a few remarked that they could imagine that someone would have troubles filling in the negatively formulated questions.

The first page of the questionnaire, which explains the research occasion and the intention of the questions, was easily passed over. Therefore all text on the front page was put in a frame in order to get more attention and importance.

In general, only minor adjustments had to be made, like putting text in frames or using shades, because the participants did not encounter many problems while filling in the questionnaire. Overall, they thought that the list was well organized and clear, and that the difficulty of filling in the questions was mostly due to the subject.

4.1.3 Procedure

The survey was mainly conducted on board of the train in order to obtain a diverse sample. While travelling through the Netherlands on board of an intercity train, it was expected to come across people of all ages, locations and education levels, which might result in a good representation of the Dutch public. Different trips were made during four days. One route went from Enschede to Leeuwarden via Zwolle, another from Leeuwarden to Rotterdam, from Rotterdam to Amsterdam, and from Amsterdam back to Leeuwarden. From Leeuwarden the train was also taken to Groningen, and further the train was taken from Alkmaar, via Amsterdam, Utrecht and Eindhoven to Maastricht, and back again, from Maastricht, via Nijmegen, Arnhem and Zwolle to Leeuwarden. In this way, the whole country was crossed, from north to south, and east to west.

All people on board were approached and asked if they had time to fill in a questionnaire. Afterwards all participants received a brochure with information about MRSA, to keep them from worrying about the possible threat of MRSA and to answer their raised questions about the topic. As it turned out some locations were difficult to reach by train, at least their residents were difficult to reach, namely Groningen and Noord Brabant. Therefore a couple of questionnaires were spread among those locations, in order to get response from inhabitants of the entire Netherlands. Zeeland was also difficult to reach, but no solutions were found to solve that problem. All questionnaires were processed by using the statistical programme SPSS 14.0.

4.1.4 Demographics

An extensive overview of the characteristics of the sample can be found in appendix 5. Only fully completed questionnaires were taken into consideration. Eleven questionnaires turned out to be incomplete. The sample size consisted out of 239 respondents of which 110 (46%) were male and 129 (54%) were female. About 50 questionnaires (20,9%) were not conducted on board of a train and 189 (79,1%) were conducted on board of a train. The mean age of the respondents was 30,67 years old, with a minimum of 13 and a maximum of

82 years old. The standard deviation was 15,97 years. The majority had a Dutch nationality (96,2%) and a Dutch father and mother (90,8% and 91,2%). Of the sample 2,5% had only completed elementary school. High school (VMBO, HAVO & VWO) was finished by 37,6% of the participants, while 59,8% had a professional education (MBO, HBO & University). Almost all provinces of the Netherlands were represented in the sample, except for Zeeland. Most participants were residents of Noord-Brabant (23,4%) and the least of Zuid-Holland (0,8%). Two respondents did not have a permanent address in the Netherlands as they lived mostly abroad. The majority of the sample rated their health condition during the past year as good to excellent (respectively 54% and 25,5%). Only 10,5% of the respondents had been admitted to the hospital during the past year. According to 9,2% of the sample, family of friends of theirs did have something to do with MRSA once, only 3,3% of the participants had been in contact with MRSA themselves.

4.2 RESULTS

The results of the confirmatory questionnaires will be covered below, according the three parts of the questionnaire. As the questionnaire mostly contained closed-form questions, all variables were described in frequencies to reveal central and frequent tendencies (Baarda & de Goede, 2001). First of all, the misconceptions concerning MRSA will be discussed, and then will be dealt with the knowledge of the respondents about MRSA. The statements of this part are divided according the different subjects of the expert mental model; prevention, spread, contamination, reservoir, consequences, risk factors, origin and treatment. After that, the risk perception of the participants will be reviewed. Finally, the information sources of the sample and whether the respondents had ever heard of MRSA before will be covered. All results are accompanied with tables providing an overview of the gathered data. Furthermore, some additional analyses will be presented.

4.2.1 Part I: Misconceptions

This part will cover the misconception propositions of the questionnaire.

4.2.1.1 Misconceptions

Table 1 summarizes the results of the propositions concerning the misconceptions about MRSA.

Table 1
Misconceptions

Statements	(maybe) True (1 & 2)	don't know (3)	(maybe) False (4 & 5)	Mean	SD
What is MRSA?					
MRSA is some kind of muscular disease	25,5%	26,8%	47,7%	3,54	1,40
MRSA is another word for mouse arm	8,8%	23,0%	68,2 %	4,16	1,17
MRSA is an immunity disorder	24,3%	38,5%	37,2%	3,28	1,27
MRSA is an illness	50,6%	22,6%	26,8%	2,69	1,50
MRSA is a tropical disease	4,6%	31,8%	63,6%	4,06	1,08
MRSA is a contagious virus	36,0%	26,8%	37,2%	2,99	1,52
Who acquires MRSA?					
MRSA can be mostly found among addicts (drugs, alcohol)	11,3%	38,5%	50,2%	3,73	1,14
MRSA can be mostly found among people, who do not take good care of themselves, e.g. tramps	9,2%	38,9%	51,9%	3,77	1,09
MRSA can be mostly found among elderly people	28,9%	41,8%	29,3%	3,13	1,19
MRSA can be mostly found among children	13,8%	41,8%	44,4%	3,53	1,07
MRSA can be mostly found among people of foreign nations	13,0%	39,3%	47,7%	3,59	1,17
What causes MRSA?					
MRSA can be transmitted by insect bites	7,1%	33,9%	59,0%	3,93	1,09
MRSA is caused by overburdening the muscles	20,1%	32,6%	47,3%	3,58	1,32
MRSA is caused by an unhealthy lifestyle	15,5%	34,7%	49,8%	3,61	1,15
MRSA is caused by alcohol and/or drug abuse	5,4%	37,2%	57,3%	3,89	1,04
MRSA is brought to the Netherlands by travellers to countries far away	28,0%	33,9%	38,1%	3,23	1,32
MRSA is brought to the Netherlands by immigrants from countries far away.	19,7%	39,3%	41,0%	3,41	1,24

Part I of the questionnaire consisted out of incorrect beliefs about MRSA, the so called misconceptions, emerged from the interviews. All given statements in this part were incorrect. Overall, it can be said that many participants did not have any clue about MRSA in general. Varying from 22,6% to 41,8% of the respondents answered 'don't know' on the questions posed in this section of the questionnaire.

On the question 'what is MRSA?,' 25,5% of the people answered 'some kind of muscular disease,' 8,8% thought that MRSA was another word for mouse arm and 24,3% was convinced of MRSA being an immunity disorder. Little more than half of the respondents (50,6%) recognized MRSA as an illness, 4,6% thought it was a tropical illness and 36,0% stated that MRSA was a contagious virus. The correct answers, options 4 & 5, to the question 'what is MRSA?' was given by 26,8 to 68,2% of the respondents.

The second question posed in this part of the questionnaire was 'Who gets MRSA?' Addicts of e.g. drugs and alcohol were seen as possible victims of MRSA by 11,3% of the sample. A little smaller part of the respondents (9,2%) thought that MRSA could be found among people who do not take good care of themselves. More than a fourth part of the participants (28,9%) pointed at elderly people as being of greatest risk of getting MRSA, 13,8% thought that children were more on the risk. Foreign nations were seen as vulnerable for MRSA by 13% of the sample. The correct answers to the question posed, answers 4 & 5, was given by 29,2 to 51,9% of the people.

'What causes MRSA?' was the last question of part I. Some respondents (7,1%) were convinced of MRSA being transmitted by insects. A rather large amount of people (20,1%) thought that MRSA was caused by overburdened muscles, while 15,5% attributed MRSA to an

unhealthy lifestyle. A small part of the sample (5,4%) stated that MRSA was caused by alcohol or drug abuse and a considerable part (28,0%) thought MRSA was brought to the Netherlands by travellers to foreign countries. Another part (19,7%) of the respondents had the idea that MRSA was brought to the Netherlands by immigrants from countries far away. The correct answer was given by 38,1 to 59,0% of the sample.

Overall, it is obvious that many respondents did not know much about MRSA. Varying from a little more than a quarter (26,8%) to a little more than two third of the sample (68,2%) did give correct answers (answering options 4 & 5).

4.2.2 Part II: MRSA knowledge

This part will cover the knowledge propositions from the questionnaire, according to the structure of the expert model.

4.2.2.1 Contamination

Table 2 summarizes the results on the propositions concerning MRSA and contamination. The +/- symbol indicates whether a statement is true or false, + means true, and – means false.

Table 2
Knowledge of MRSA - Contamination

Statements per section	+/-	(maybe) True (1 & 2)	don't know (3)	(maybe) False (4 & 5)	Mean	SD
One can carry MRSA without becoming ill	+	48,5%	40,6%	10,8%	2,47	0,99
MRSA may cause an infection	+	72,4%	21,8%	5,8%	2,00	0,97

This concept contained two items in the questionnaire, as the interview results suggested that people could not really distinguish between colonization and infection.

Overall, it seems that some people (48,5%) are aware of the possibility of carrying MRSA and not becoming ill, instead of being infected with it. Noticeably, 40,6% did not know if this proposition was right or wrong. People appear to be convinced that MRSA may cause an infection.

4.2.2.2 Prevention

Table 3 summarizes the results of the propositions concerning MRSA and prevention. The +/- symbol indicates whether a statement is true or false, + means true, and – means false.

Table 3
Knowledge of MRSA - Prevention

Statements per section	+/-	(maybe) True (1 & 2)	don't know (3)	(maybe) False (4 & 5)	Mean	SD
MRSA cannot be prevented by good hygiene	-	31,8%	34,3%	33,8%	3,00	1,16
Injection with a vaccine can prevent from MRSA	-	15,5%	54,8%	29,7%	3,27	0,99
People who are a lot outside, cannot acquire MRSA	-	5,9%	30,5%	63,6%	3,88	0,95
People who do not smoke or drink cannot acquire MRSA	-	1,3%	23,4%	75,4%	4,27	0,88

Summarizing these results can be said that, despite of good hygiene being the only way of preventing a person from MRSA-colonization, only 33,8% of the respondents was aware of that. There does not exist any vaccination that prevents from MRSA, only 29,7% thought that vaccination would not be protect from MRSA. People do seem to understand that being a lot outside and no smoking or drinking does not contribute to prevention from MRSA. Again it is notable that a rather large group does not know if the statement is either true or false (respectively 23,4 & 54,7%).

4.2.2.3 Reservoir

Table 4 summarizes the results of the propositions concerning MRSA and its reservoir. The +/- symbol indicates whether a statement is true or false, + means true, and – means false.

Table 4
Knowledge of MRSA - Reservoir

Statements per section	+/-	(maybe) True (1 & 2)	don't know (3)	(maybe) False (4 & 5)	Mean	SD
MRSA can be found at the mucous membranes, like in the intestines, nose and throat	+	29,3%	57,3%	13,4%	2,78	0,95
MRSA can be found in the blood	+	38,9%	47,3%	13,8%	2,71	1,04
A blood sample can prove if one has MRSA	+	59,4%	29,7%	10,9%	2.32	1,09
MRSA can be found at hair	+	5,9%	49,8%	44,4%	3,66	1,00
MRSA can be found at the skin	+	15,5%	66,5%	18,0%	3,05	0,87

In order to investigate whether people have an idea of where to find MRSA on the body, 5 items were included in the list.

These results suggest that people are not sure where to find MRSA on the body. A large part of the sample answers 'I do not know' (29,7 – 66,5%) to the reservoir propositions. Only a small part of the participants marks the right answer (5,9 – 29.3%). Remarkably is that MRSA being in the hair seems rather unlikely to people, while this is a true spot of MRSA. People seem to think that a blood sample is a common measure to check whether a person is contaminated with MRSA or not (59,4%), but actually it is more common to use a sample of the mucous membranes. This indicates also that people are unaware of the reservoirs of MRSA, since blood is a well-known reservoir of diseases, and therefore could be guessed, while the hair and the skin are not such familiar reservoirs.

4.2.2.4 Spread

Table 5 summarizes the results of the propositions concerning MRSA and its spread. The +/- symbol indicates whether a statement is true or false, + means true, and – means false.

Table 5
Knowledge of MRSA - Spread

Statements per section	+/-	(maybe) True (1 & 2)	don't know (3)	(maybe) False (4 & 5)	Mean	SD
MRSA spreads through direct contact	+	40,6%	33,1%	26,4%	2,77	1,29
MRSA spreads through the air	+	32,2%	41,4%	26,3%	2,96	1,19
MRSA spreads possibly from animal to human	+	20,9%	51,5%	27,6%	3,13	1,04
MRSA spreads through the environment	+	47,7%	35,6%	16,8%	2,64	1,14

This topic was covered by four items covered. The results of the questionnaire suggest here that people are not sure how MRSA spreads; 33,1 to 51,5% does not have an answer regarding the spread of MRSA while 16,8 to 27,6% does give a wrong answer. MRSA spreading through the environment was the most familiar way of spreading, and MRSA spreading from animal to human was the most unfamiliar way of spreading. Overall, it can be said that a majority of the sample seems unknowing about MRSA and its spread.

4.2.2.5 Consequences

Table 6 summarizes the results of the propositions concerning MRSA and its consequences. The +/- symbol indicates whether a statement is true or false, + means true, and – means false.

Table 6
Knowledge of MRSA - Consequences

Statements per section	+/-	(maybe) True (1 & 2)	don't know (3)	(maybe) False (4 & 5)	Mean	SD
MRSA starts with high fever just like influenza	-	29,7%	61,5%	8,8%	2,72	0,89
MRSA can be fatal	+	54,0%	36,4%	9,7%	2,27	1,09
One cannot leave the hospital as long as one has MRSA	-	51,0%	30,1%	18,8%	2,48	1,27
One with MRSA cannot undergo a surgery	-	45,2%	36,8%	18,0%	2,59	1,21

Four propositions handled the consequences of MRSA. It seems that the people are aware of the possible fatality of MRSA. Unfortunately, the respondents were not that into the other consequences of MRSA, as all other propositions were incorrect, but rather highly rated. A large percentage of the participants, 30,1% - 61,5%, marked the answer 'do not know,' which indicates that people are kind of unsure about the consequences of MRSA.

4.2.2.6 Risk factors

Table 7 summarizes the results of the propositions concerning MRSA and its risk factors. The +/- symbol indicates whether a statement is true or false, + means true, and – means false.

Table 7
Knowledge of MRSA – Risk factors

Statements per section	+/-	(maybe) True (1 & 2)	don't know (3)	(maybe) False (4 & 5)	Mean	SD
One who never visits the hospital will not acquire MRSA	-	18,0%	15,1%	66,9%	3,81	1,31
Only children can acquire MRSA	-	2,1%	25,1%	72,8%	4,23	0,91
MRSA is a hospital bacterium and therefore of no danger to society	-	9,6%	16,3%	74,0%	4,05	1,13
A weakened immune system increases one's risk of getting MRSA	+	75,3%	19,7%	5,0%	1,98	0,96
MRSA can only be found in hospitals, e.g. in surgeon rooms	-	23,0%	29,7%	47,3%	3,38	1,23
Surgery increases one's risk of acquiring MRSA	+	40,2%	36,8%	23,1%	2,79	1,20
One can be more susceptible to MRSA than another	-	66,5%	28,9%	4,6%	2,16	0,87
Residence in a nursing home increases the risk of MRSA	+	40,6%	37,2%	22,2%	2,81	1,12
Poor hygiene increases the risk of MRSA	+	63,6%	22,6%	13,8%	2.34	1,08
Everyone has equal risk of acquiring MRSA	+	29,3%	36,0%	34,8%	3,05	1,20
Recent hospitalization abroad increases the risk of MRSA	+	50,2%	37,2%	12,6%	2,46	1,09
Crowded living conditions increase the risk of MRSA	+	31,8%	43,5%	24,6%	2,92	1,09
Skin problems, like eczema, increase the risk of MRSA	+	13,8%	60,7%	25,5%	3,19	0,93
One can be immune to MRSA	-	18,4%	47,7%	33,9%	3,28	1,09
Only aged people can acquire MRSA	-	4,2%	26,8%	69,0%	4,08	1,00
Cuts or abrasions increase the risk of MRSA	+	55,6%	33,9%	10,4%	2,41	1,02
Treatment in or admission to the hospital increases the risk of MRSA	+	54,4%	31,4%	14,2%	2,43	1,13
Skin to skin contact increases the risk of MRSA	+	29,3%	49,8%	21,0%	2,93	1,04
At some hospitals MRSA returns, like it has never been gone	-	43,9%	47,3%	8,8%	2,48	1,01

The construct 'risk factors' was covered by the most items. Risk factors on which many participants agreed were; 'weakened immune system,' (75,3%) 'one can be more susceptible to MRSA than another,' (66,5%) 'poor hygiene,' (63,6%) 'recent hospitalization abroad,' (50,2%) and 'cuts or abrasions,' (55,6%). The least named risk factors included; 'only children can acquire MRSA,' (2,1%) 'MRSA is no danger to society,' (9,6%) and 'only aged people can acquire MRSA' (4,2%).

The participants seemed quite sure about certain risk factors, like if only children can get MRSA (72,8% disagrees correctly), that MRSA is a danger to society, despite of being a hospital bacterium (74,0% agrees) and that a weakened immune system increases one's risk of getting MRSA (75,3% agrees correctly). On the other hand, some specific MRSA risk factors like, crowded living conditions increasing the risk of MRSA (31,8% correctly agrees, 43,5% does not know), skin problems increasing the risk of MRSA infection (13,8% answers correctly, 60,7% is unsure about this) or surgery increasing the risk of getting MRSA (unknown to 59,9% of the sample) were not familiar to people. Overall, 15,1 – 60,7% of the participants answered 'do not know' at the statements, this suggests that a considerable number of people is unsure about the risk factors of MRSA.

4.2.2.7 Origin

Table 8 summarizes the results of the propositions concerning MRSA and its origin. The +/- symbol indicates whether a statement is true or false, + means true, and – means false.

Table 8
Knowledge of MRSA - Origin

Statements per section	+/-	(maybe) True (1 & 2)	don't know (3)	(maybe) False (4 & 5)	Mean	SD
MRSA can be found at the general population	+	61,9%	21,8%	16,3%	2,34	1,22
MRSA can be found in nursing homes	+	50,6%	34,3%	15,0%	2,53	1,12
MRSA can be found at cattle, like pigs and cows	+	21,8%	55,6%	22,6%	3,02	1,10
MRSA can be found in hospitals	+	83,7%	12,6%	3,8%	1,62	0,92

The concept 'origin of MRSA' was covered by four items in the questionnaire. In general, it seems that people are aware of the possibility of MRSA being found in society (61,9%), nursing homes (50,6%), and of course in hospitals (83,7%) but that MRSA can origin from cattle was rather unknown; 21,8% answered correctly but 78,2% did not know this. Still, a large amount of people (21,8 – 55,6%) answered 'do not know,' except on the possibility of MRSA being found in the hospital, which was quite familiar to people.

4.2.2.8 Treatment

Table 9 summarizes the results of the propositions concerning MRSA and its treatment options. The +/- symbol indicates whether a statement is true or false, + means true, and – means false.

Table 9
Knowledge of MRSA - Treatment

Statements per section	+/-	(maybe) True (1 & 2)	don't know (3)	(maybe) False (4 & 5)	Mean	SD
There exist various MRSA treatments	-	33,5%	46,0%	20,5%	2,78	1,04
Disinfection measures are a way of fighting MRSA	+	54,4%	36,8%	8,8%	2,33	1,02
MRSA can only be combated with specific antibiotics	+	48,1%	40,2%	11,7%	2,47	1,04
Recent hospitalization abroad is a reason for isolation	+	28,5%	33,1%	38,5%	3,18	1,30
Most antibiotics do not work for MRSA	+	36,6%	53,5%	10,0%	2,65	0,95
Early treatment of MRSA decreases the mortality rate	+	53,1%	38,1%	8,8%	2,41	1,01
One with MRSA has to be isolated	+	59,0%	23,0%	18,0%	2,31	1,29
One with MRSA has a longer hospital stay than usual	+	68,2%	25,5%	6,2%	2,13	1,59

The last concept of the questionnaire to be covered was treatment. People seemed unfamiliar with the limited treatment options concerning MRSA: 33,5% thinks there exist various treatments, and 63,5% of the sample does not know that most antibiotics do not work. That recent hospitalization abroad is a reason for isolation is also unknown to 68,6% of the participants. Remarkable, is that 68,2% thinks that MRSA may result in a longer hospital stay, which might be true, and that more than half of the contestants (59,0%) are aware of being

isolated when having MRSA. What strikes is that 23,0 – 53,5% answers 'do not know' at the statements concerning treatment of MRSA. This suggests that most people are unsure or unknowing regarding the treatments of MRSA.

4.2.3 Part III: Risk perception, information sources, health status & demographics

This last part of the results will discuss the answers given to part III of the questionnaire; risk perception and information sources.

4.2.3.1 Risk perception of MRSA

Part III of the questionnaire started with four risk perception statements. These results can be found in table 10. Almost half of the participants (46,9%) felt that MRSA was a serious risk for the society, whereas 23% did not agree with that statement. Another 30,1% did not know whether MRSA a risk for society was or not. Almost one third of the respondents (31%) thought that their risk of getting MRSA was smaller than the risk of other people, 42,7% did not know if they had a smaller risk to MRSA than other people. More than a quarter of the sample (26,3%) felt that their personal risk to MRSA was not smaller than the risk of other people. MRSA was not experienced as a threat to the health by 51,5% of the respondents, whereas 21,8% did think that MRSA was a threat to their health. A little more than a quarter of the participants (26,8%) did not know if MRSA was a threat to their health. On the statement 'if I never visit the hospital, I will never get MRSA' 12,6% of the people agreed, while the majority (57,7%) did not agree. More than a quarter of the respondents (29,7%) did not know whether they would get MRSA by visiting the hospital or not.

Table 10
Risk perception of MRSA

Statements	(totally) agree (1 & 2)	don't know (3)	(totally) disagree (4 & 5)	Mean	SD
I think that MRSA is a serious risk to society	46,9%	30,1%	23,0%	2,63	1,17
Compared to others my personal risk to MRSA is small	31,0%	42,7%	26,3%	2,95	1,03
I do not think that MRSA is a threat to my health	51,5%	26,8%	21,8%	2,53	1,19
If I never visit the hospital, I will never get MRSA	12,6%	29,7%	57,7%	3,77	1,14

Putting this together it seems that most people are aware of the risk MRSA poses on the society and that they are rather positive concerning both their personal risk to MRSA and MRSA as a threat to their health. It also seems that people think that MRSA can also be acquired outside the hospital.

4.2.3.2 Information sources of MRSA

Part III of the questionnaire also explored whether people had heard of MRSA ever before, and if they did, where they got their information from. Table 11 gives an overview of the results on this particular topic. It was possible for the respondents to give multiple answers.

Ninety respondents (37,7%) had never heard of MRSA before. A considerable part of the sample, ninety participants (37,7%), got their information from television, among others. Almost one third of the participants (32%) got their knowledge of MRSA from the radio, among others. Newspapers were also popular as information source, 30,5% of the sample got their information from it. Only 11,3% of the respondents named Internet as source of their MRSA knowledge. Another 21,3% attributed their knowledge of MRSA to family, friends or acquaintances. Thirty-six people named other sources for their information, like for example, their work (experience), study or hospital visits.

Table 11
Information sources of MRSA

Statements	N (239)	Percentage
I have never heard of MRSA before	90	37,7%
Television	90	37,7%
Newspapers	73	30,5%
Family, friends or acquaintances	51	21,3%
Other	36	15,1%
Radio	32	13,4%
Internet	27	11,3%

Summarizing can be said that a majority of the public had never heard of MRSA before and that television and newspapers are popular information sources.

4.2.4 Additional analyses

In this part of the results some additional analyses will be done.

4.2.4.1 Inhabitants of Noord-Brabant and MRSA on cattle

The sample of this study included 56 inhabitants of Noord-Brabant of a total of 239 respondents, which is a rather large amount of participants compared to other provinces. While examining the results, it was noticed that some inhabitants of Noord-Brabant mentioned the relation between pigs and MRSA, by filling in the spaces left open for answers other than the given ones. This raised supposition that inhabitants of Noord-Brabant are more aware of the relation between MRSA and pigs than inhabitants of other provinces. Since the most pig farms are concentrated in the province Noord-Brabant, this could be a possibility. Therefore, it is examined if inhabitants of Noord Brabant were more aware of the transfer of MRSA from animal to human, and that MRSA can be originated from cattle. Results can be found in table 12.

Table 12

Inhabitants of Noord-Brabant versus the remaining public concerning MRSA on cattle

	MRSA spreads possibly from animal to human			MRSA can be found at cattle			
	(maybe) True (1 & 2)	Mean	SD	(maybe) True (1 & 2)	Mean	SD	N
Noord-Brabant	35,7%	2,91	1,25	39,3%	2,71	1,30	56
Remaining public	16,4%	3,20	0,96	16,4%	3,11	1,01	183

It seems that the inhabitants of Noord-Brabant are relatively more aware of the risk concerning MRSA and animals, than respondents not living in Noord-Brabant. Overall, this indicates that there are differences between the mental models of inhabitants of Noord-Brabant and the Dutch people not living in Noord-Brabant.

Therefore, it is decided to compare the means of these groups by using independent-samples T-test. The null hypothesis assumes that there are no differences between the means of the groups, and the alternative hypothesis assumes that there are differences between the means of the groups. The null hypothesis will be rejected when the probability of the obtained results is smaller than or equal to the significance level of 0,05.

Table 13

Results of the independent-samples T-test: Inhabitants of Noord-Brabant versus the remaining public

			MRSA spreads possibly from animal to human			MRSA can be found at cattle		
	N	$\alpha = 0,05$	Equal variances assumed	Mean	SD	Equal variances assumed	Mean	SD
Noord-Brabant	56	F	6,614	2,91	1,25	11,934	2,71	1,30
Remaining public	183	Sig.	0,011	3,20	0,96	0,01	3,11	1,01

The probability of the obtained results is 0,011 in case of the comparison of the means of the proposition 'MRSA spreads possibly from animal to human.' This value is smaller that the significance level of 0,05, so the null hypothesis is rejected. In case of the comparison of the means of the proposition 'MRSA can be found at cattle,' the probability of the obtained results is 0,01, which is smaller than the significance level of 0,05, so the null hypothesis is rejected.

The results indicate that the differences between the means of inhabitants of Noord-Brabant and the remaining public, concerning both propositions, are significant. However, the sample sizes of the subgroups differ a lot.

4.2.4.2 Recent hospitalization and MRSA awareness

Further exploration has been done to people who have been admitted to the hospital in the past year. It is examined if they had heard of MRSA before, more often, than the general Dutch public. The results can be found in table 13.

Table 13

Recent hospitalization versus not recently hospitalized

	I have never heard of MRSA before	N
Recent hospitalization	44,0%	25
Not recently hospitalized	36,9%	214

Recent hospitalization does not seem to raise the awareness of MRSA. In this study, 44% of the people, who had been recently hospitalized, did not hear of MRSA before. Summarizing, these results do not indicate differences between the mental model of people, who have, and people, who have not, been recently hospitalized.

5 CONCLUSIONS AND RECOMMENDATIONS

This chapter will present the conclusions of this study. The first paragraph will answer the main research question. The second part of this chapter will cover the sub research questions.

5.1 MAIN RESEARCH QUESTION

The main research question was:

'What are the existing beliefs of the general Dutch public concerning MRSA and what risk information suits these beliefs best?'

More than one third of the people were not familiar with MRSA, as appeared from this study, which may have caused some of the present misconceptions in the lay mental model. The findings also reveal that the answer 'do not know' is given regularly. This suggests that the general Dutch public needs information concerning this risk that explains basically what MRSA implies.

The present knowledge of the general Dutch public shows many gaps, especially concerning, 'prevention,' 'reservoir,' 'consequences,' and 'treatment options' of MRSA. These gaps should be addressed as described in paragraph 5.2.3, in order to create a mental model, suitable for making informed health decisions. Enabling informed health decisions include preventing disease, reducing health risks, and improving the health of individuals by providing suitable information. In the case of MRSA, for example hygiene precautions and factors that increase the risk of contamination with MRSA should be promoted.

Overall, it is clear that the general Dutch public is not aware of the threat posed by MRSA. Therefore, the existing misconceptions need to be corrected and basic information concerning MRSA should be provided to the public.

5.2 SUB QUESTIONS

This paragraph will answer the sub questions. Models support and explain the findings.

5.2.1 Sub question 1: the lay mental model

Sub question 1 comprised:

'What is the mental model of the general Dutch public regarding MRSA?'

The findings from the confirmatory questionnaires were edited to make them fit in the model, created in the chapter 'mental models interviews.' This version of the model already included the non-expert beliefs, which emerged from the mental models interviews and on

which the questionnaires were based. The model, which originated from the interviews, completed with the results from the confirmatory questionnaires was called: The lay mental model. This lay mental model represents the mental model of the general Dutch public regarding MRSA, and can be found in appendix 6, figure 3. Keep in mind that many people answered 'do not know' and in the model only confirming answers are shown. The model represents what people do seem to know and think about MRSA.

The lay mental model shows that the general Dutch public, not familiar with the term MRSA, seems to think that MRSA is an illness, a contagious virus or some kind of muscular disease. It is obvious, that people tend to associate MRSA with health; all answering options in the questionnaire were somehow related to health, as appeared from the answers given during the interviews. Illness and contagious virus come close to the truth, but are not right.

Before revealing the meaning of MRSA, the Dutch public tended to think that MRSA was mostly acquired by elderly, children and foreign nations. It seems that the general Dutch public does not experience MRSA as a threat to all people, but merely people who are supposed to be weaker. A weakened immune system is a risk factor of acquiring MRSA, but not a requirement; everyone can become weaker (temporally), and therefore acquire an MRSA-infection.

Without telling the meaning of the abbreviation MRSA, the general public attributed MRSA to being brought to the Netherlands by travellers to countries far away (28,0%), overburdened muscles (20,1%) and to immigrants from countries far away (19,7%). The link with foreign countries is in accordance with the attribution of the general public of MRSA being mostly acquired by foreign nations (13,0%). It seems that the general Dutch public associated MRSA with being a health threat from foreign countries. Overburdening, as being the cause of MRSA can maybe be explained through the suspicion of MRSA being a muscular disease (25,5%), both statements refer to muscles.

Considering the answers to the statement 'MRSA is a hospital bacterium, and therefore of no danger to society,' it seems that people understand that there exists a hospital-acquired and a community-acquired version of MRSA. However, the both aspects were never literally named in the questionnaire.

It seems that people do distinguish between colonization and infection in relation to MRSA. Although it is not that clearly stated in the questionnaire, the Dutch public agrees on carrying MRSA without becoming ill, whereas they also recognize that MRSA may cause an infection.

Concerning the concept prevention, a part of the general Dutch public tends to think that MRSA cannot be prevented by good hygiene, which is a misconception. Another misconception is that an injection with a vaccine can prevent from MRSA-colonization; some people also think that is true. Two other misconceptions in this construct; 'no smoking or alcohol drinking prevents from MRSA' and 'being a lot outside prevents MRSA-colonization'

are seen as nonsense. Very few people (respectively 1,3 and 5,9%) agreed on this. Remarkably, none of the expert nodes in this construct is addressed. This already emerged from the interviews, but it is clear that the general Dutch public has its own ideas about preventing MRSA.

Regarding the reservoir of MRSA, the Dutch people are aware of the fact that MRSA can be found in the blood, but people do not seem aware of the fact that MRSA can be found in the hair, on the skin and in wounds, which are important reservoirs. However, people seem to acknowledge that MRSA can be found in the nose, mouth/pharynx and faeces, also known as the mucous membranes, another important reservoir.

The general Dutch public seems to acknowledge that MRSA spreads through direct contact, air, and environment. It is also acknowledged by a part of the Dutch public that MRSA spreads from animal to human.

The consequences of MRSA are, according to the general Dutch public, death, a hospital stay till the MRSA is gone, not being able to undergo surgery and in the beginning high fever, like influenza. Of these consequences, only death is true.

The risk factors of MRSA are, in accordance with the general Dutch public, recent hospitalization abroad, invasive medical procedures / surgery, having a weakened immune system, wounds, hospital, nursing homes, poor hygiene, crowded living conditions, and frequent body contact. Not so many people knew that skin problems may increase the risk of acquiring MRSA-infection too. Of the incorrect risk factors, emerged from the interviews, people believed that some people were more susceptible to MRSA than others, that acquiring MRSA is genetically determined and that in some hospitals MRSA returns, like it has never been gone. People unanimously disagreed with MRSA as being restricted to children and elderly, and most people do not believe that MRSA is restricted to the hospital.

Concerning the concept origin of MRSA, the general Dutch public does understand that the origin of MRSA can be found in hospitals, nursing homes and also in the community among the general public. That the origin of MRSA can also lie in the veterinary area was acquainted with a smaller part of the general Dutch public.

The knowledge of the general Dutch public concerning treatment options for MRSA seems limited. The general Dutch public acknowledges that a timely treatment would result in a lower mortality rate, that isolation measures are part of the treatment and that MRSA might result in an extended hospital stay. Contamination with MRSA is combated with disinfection measures and directed antibiotics, which appears to be known by the general Dutch public. However, little people understand that there are only a few treatment options concerning MRSA-infections and that only directed antibiotics work. Those few possible treatment options regarding MRSA-infections are the essence of the threat posed by MRSA. The Dutch public is also not familiar with the isolation measures for people who have been recently hospitalized abroad.

Overall, it can be said that the general Dutch public has several misconceptions concerning MRSA and lacks specific information concerning MRSA. The misconceptions mostly address MRSA in general and the constructs; 'prevention,' 'risk factors,' and 'consequences' of MRSA. The available knowledge of the general Dutch public addresses mainly common health facts.

5.2.2 Sub question 2: The lay mental model versus expert model

Sub question 2 was:

'To which extent does the lay mental model differ from the expert model?'

In order to compare the lay mental model with the expert model, both models were analyzed and the differences were listed. Both models can be found in the appendix, the expert model in appendix 1, figure 1, and the lay mental model in appendix 6, figure 3.

Basically, the appearance of both models is similar, because the lay mental model is derived from the expert model. However, the lay mental model is completed with the non-expert beliefs that prevail among the general Dutch public. Apart from the appearance, the contents of both models differ and that is what this is all about. The differences between the lay and the expert mental model can be divided into two major clusters, namely; available, but incorrect knowledge, called misconceptions, and missing knowledge, also called gaps.

The lay mental model contains three constructs of non-expert beliefs, which are 'what is MRSA,' 'victims of MRSA,' and 'causes of MRSA.' These misconception constructs are not included in the expert model, because they are incorrect. Thus, the lay mental model comprises, in contrast to the expert model, erroneous knowledge concerning the meaning, victims and causes of MRSA.

Concerning the hospital-acquired and community-acquired MRSA nodes, these appear in both models. However, it is questionable, if the distinct between HA-MRSA and CA-MRSA is made clearly enough in the questionnaire.

The lay mental model does not contain any non-expert beliefs regarding contamination. There is also no information missing in this construct, compared with the expert model. However, it is questionable, if the distinct between colonization and infection is made clearly enough in the questionnaire.

Considering the construct prevention, it can be seen that the lay model does not address any expert nodes, but only non-expert beliefs. There is also no distinction made in prevention measures for HA-MRSA and CA-MRSA, which can be seen in the expert model. Therefore, it can be said that the lay model compared to the expert model, lacks knowledge of prevention in the case of MRSA.

Concerning the topic reservoir in the lay mental model, information about animals and surfaces being reservoirs, present in the expert model, is missing in the lay model. Thus,

the lay mental model contains limited knowledge concerning reservoirs of MRSA, so essential information is missing, compared to the expert model.

The concept spread in the lay mental model, is missing information about certain aspects of spread in comparison with the expert model, that is to say; 'surfaces,' 'needles,' 'mutation of MSSA,' and 'avoiding the spread' are absent in the lay model. There are no non-expert beliefs present in this construct of the lay mental model.

About the consequences of MRSA in the lay mental model can be said, that only 'sepsis/death' is present as an expert node, and that there are three incorrect aspects in this construct, namely; 'MRSA starts with high fever, like influenza,' 'one cannot leave the hospital till the MRSA is gone,' and 'one cannot undergo surgery, when having MRSA.' Therefore, it is clear that the lay mental model lacks information concerning consequences, compared with the expert model, but that some incorrect knowledge is available.

The construct risk factors in the lay mental model contains some non-expert beliefs, namely; 'restricted to hospitals,' 'restricted to children,' 'restricted to elderly,' 'certain hospitals,' and 'genetically determined.' Furthermore, there is missing information about 'the use of antibiotics,' 'crowded living conditions,' and 'sport teams' in the lay mental model, compared to the expert model. In proportion to other constructs, it can be concluded that the least knowledge is missing in this construct, but there are also more misconceptions, than in the other constructs.

Information about the origin of MRSA in the lay mental model contains no incorrect information, but there is some knowledge missing, to sum up; the origin 'unknown' and 'foreign countries.' Also, 'taking right precautions' is not included in the lay model. In general, this construct misses some information in comparison to the expert model.

Concerning the treatment options for colonized people in the lay model, it is noted that the specific disinfection measures 'nose cream' and 'shampoo' are missing just like the registration of MRSA cases by the RIVM. About the treatment options for infected people, can be said, that the lay model is missing information about 'wrong antibiotics,' 'no new antibiotics available,' 'increased mortality rate,' 'delayed treatment,' and 'extended recovery period.' Lots of information is missing concerning the treatment of people with MRSA, colonized or infected, in the lay mental model, but no incorrect information is available on this topic.

Summarizing, the main differences between the expert model and the lay mental model, address the misconceptions hold by the general Dutch public and the lack of information concerning certain constructs. The misconceptions mainly deal with the basic concepts regarding MRSA, 'what is MRSA?,' 'who acquires MRSA?,' and 'what causes MRSA?' The knowledge gaps are most apparent in the constructs; 'prevention,' 'reservoir,' 'consequences,' and 'treatment options' of MRSA.

5.2.3 Sub question 3: Information needs

Sub question 3 was:

'What information does fit the existing beliefs and knowledge of the Dutch people concerning MRSA?'

The most important information need of the general Dutch public, should address the essence of MRSA, because there are many misconceptions concerning the meaning, victims, and causes of MRSA, held among the public. These false beliefs should be corrected before more specific information about MRSA can be launched, because otherwise it would not fit in the existing beliefs of the general Dutch public. If, for example, a person still thinks that MRSA is a muscular disease, information concerning hygiene precautions to avoid MRSA, would seem futile to that person. It does not seem logical that a muscular disease can be prevented by good hygiene, and therefore the person will not process the information. It also appears from the questionnaire that many people answered 'do not know' when asking about MRSA, without revealing its meaning. Therefore, the most basic concepts of MRSA should be addressed.

As soon as people are aware of the problems concerning MRSA, it would be important to distinguish between hospital acquired and community acquired MRSA. It appears from the questionnaire that people understand that the danger of MRSA is not limited to the hospital, but it is questionable if people conceived this statement in the right way. To emphasize that MRSA is a danger to society as well, this should also be taken into consideration.

Despite of the fact that there is no missing information in the construct contamination, or non-expert beliefs that have to be corrected, it is questionable if the distinction between colonization and infection is made clear enough in the questionnaire. Still, this distinction is very important because people without any symptoms, can be contaminated and can spread the bacterium. Therefore, this concept needs to be included in information about MRSA.

Another important concept that needs to be addressed is prevention. People do not seem to be aware of any prevention measure, instead of that they rely on some non-expert beliefs for preventing from MRSA. Prevention measures differ for HA-MRSA and CA-MRSA, but hygiene is an aspect of this concept that should be highlighted, since all other aspects have something to with hygiene. However, it appears from the lay mental model, that people think that hygiene does not prevent from MRSA. Therefore, this aspect needs to be addressed specifically. The misconceptions held by the public concerning prevention from MRSA, should also be corrected, especially the belief that a vaccine would offer protection. As it is not possible, to develop a vaccine that terminates a bacterium, this belief gives unjustified confidence. The other false beliefs, concerning prevention, are not that important to address,

since, no smoking and drinking, and being a lot outside, would not do any harm to anyone. Therefore, paying attention to them would have no priority.

The topic reservoir is also important to highlight, as most people do not seem to know where MRSA can be found on the body and that it also can be found on animals and all kinds of surfaces. People seem to think mistakenly that MRSA is present in the blood and that a blood sample can prove if one is contaminated with MRSA or not. In fact, MRSA can be found on more easy-to-reach spots, like skin, hair, etc. This information will be useful in combination with the hygienic factor discussed above. If people know where MRSA can be found, they will understand why those hygienic measures are that important. Thus, information should be provided about the actual reservoir of MRSA, and that MRSA cannot be found in the blood, in contrast to other health threats, which makes MRSA so difficult to combat.

How MRSA spreads would also be an important subject for information about MRSA. People seem to be aware of most ways of spreading, but being aware of how MRSA spreads, would surely contribute to the hygiene aspect, which needs to be addressed. Then, people would know where to expect MRSA, and be able to take the right, hygienic precautions. There are no false beliefs in this construct that need to be corrected. Thus, the spread of MRSA should be addressed anyway.

Concerning the consequences of MRSA, it seems that the public associates MRSA with death, which might indeed be a consequence of MRSA, but which is also the last phase in the process of MRSA-infection. Given the fact, that people were not familiar with other consequences of MRSA, these might be addressed by emphasizing that MRSA may cause serious infections, since all consequences are basically infections, but that these do not necessarily have to be fatal, in order to avoid extreme fear of MRSA. It might even be sensible to address that skin infections/boils occur most frequently with CA-MRSA, in order to create more distinction in both types of MRSA. The non-expert beliefs, which are present in this construct, are not essential to correct, as they are inferior to the real consequences. Communicating to the public, that surgery will be performed if necessary, when one is contaminated with MRSA, may relieve the concerns people have regarding this aspect, but is not essential. Overall can be said, that the worst consequence of MRSA is familiar with the public, but the more common consequences, like serious infections, should be addressed.

About the risk factors of MRSA can be said, that the present misconceptions 'restricted to hospital, children and elderly,' do not need to be taken into consideration concerning information provision. The beliefs 'restricted to children,' and 'restricted to elderly,' (respectively 2,1 and 4,2%) do not seem to be widely shared in the population, therefore they do not have priority. That MRSA is not restricted to the hospital will be made clear when addressing that MRSA also occurs outside the hospitals, as advised above. Misconceptions that do need to be corrected are 'certain hospitals' and 'genetically

determined.' MRSA is not a problem of some hospitals, but can occur in any hospital and even in society. In order to prevent some hospitals from acquiring a bad image, this non-expert belief needs correction. It is also important to state, that every person may become contaminated with MRSA and that this has nothing to do with genetics. Missing information, which should be provided, concerns 'use of antibiotics,' because antibiotics are the origin of the all MRSA problems. An unhealthy lifestyle can be seen as a cause of a weakened immune system, which is commonly known to be a risk for health threats, and, therefore, does not need much attention. Further, the risk of skin problems is not commonly acknowledged as a risk factor, while it relates to CA-MRSA. Other risk factors of MRSA are connected with topics discussed before, and when addressing these elements, one should understand the linked risk factors. A topic, which is already acknowledged by the public, but which is an important risk factor, is 'recent hospitalization abroad,' or more general, the prevalence of MRSA abroad. In general, it can be said, that when addressing the subjects discussed above, like hygiene, spread and reservoir, people might be able to figure out most possible risk factors themselves, because all risk factors are somehow related to these aspects. Some special attention may be paid to MRSA abroad, in the context of hospitalization, and further, the use of antibiotics and skin problems.

The concept origin of MRSA is not that important to the general Dutch public, because it concerns the strain of MRSA, which is more scientific information. Overall, the public is aware of the origins of MRSA, the only missing information concerns the unknown origin and foreign countries, and there are no non-expert beliefs present. Foreign countries should be included in information provision about MRSA, as the problem is more common abroad, but it is already taken in consideration, when information about hospitalization abroad is added. That the origin of MRSA can also lie in animals, like pigs and pets, might be useful information to people, but it may evoke unrest. For example, people may refuse to eat meat, because they are afraid of contamination, but this type of transfer has not been proved yet. In general, it can be said, that information concerning origin of MRSA will not be that useful to the public.

Regarding the treatment options of people contaminated with MRSA, information should be provided on the antibiotic issue, as proposed above. People should realize that the main threat of MRSA is the failing antibiotics, then they might understand the size of the problem, as treating with wrong antibiotics results in more resistance, and there are no new antibiotics available. Furthermore, time is essential in treatment of MRSA contamination. This might be included to, in order to make people aware of possible contamination. The public might be more compliant with the prevention measures, like practising good hygiene, or complying with the infection control measures when visiting a hospital, when understanding the antibiotic issue. Being cautious, not to fear the public too much is can be avoided by ensuring that treatment is, for the time being, still possible. Thus, highlighting the antibiotic

issue might contribute to a better understanding of the MRSA threat, and should therefore be addressed.

While designing proper information for the general Dutch public, the risk perception of the general Dutch public should also be taken into consideration, because it helps understanding how the people experience MRSA. In general, people do not tend to experience MRSA as a serious risk to society and certainly not as a risk to their personal health.

In order to provide the general Dutch public with information about MRSA, it is recommended to use the media, which is named as an information source in this study. The most popular means include television and newspapers. The role of family, friends and acquaintances, in providing information, should not be underestimated.

Overall it can be said that first of all, the basic concepts of MRSA should be communicated to the general Dutch public, in order to correct the misconceptions and to promote the term MRSA, which needs more familiarity, because people were more acquainted with the term 'hospital bacterium,' that refers to a type of MRSA, HA-MRSA. After that, the gaps in the knowledge of the public can be addressed. The information should be presented along the preferred information sources and consider the risk perception people have of MRSA.

6 DISCUSSION

This chapter will discuss the results of the conducted study. First, its scientific contribution will be covered. The second paragraph will consider the limitations of this research. The chapter concludes with some recommendations for future research.

6.1 CONTRIBUTION TO SCIENTIFIC RESEARCH

This research offers an insight into the perception of and the experience with MRSA, of the general Dutch public. MRSA is becoming a serious public health threat, as can be concluded from the increasing prevalence of community-acquired MRSA in multiple countries and the substantial morbidity and mortality associated with these infections (Zetola et al., 2005). This also appears from the recent discovery, that MRSA can be transferred from animals to human (Health Council of the Netherlands, 2006). These strains of MRSA cannot be controlled in the way hospital-acquired MRSA is controlled, and they pose new threats on the public. Therefore, it is necessary to prepare the people and inform them about these risks. This study is a first step in the development of appropriate communication means that will help people make informed-decisions about their own health.

Investigating the beliefs of a whole nation on a certain health threat, poses its investigators for several difficulties. The Mental Models Approach of Granger Morgan et al. (2001) offers a method, which is scientifically founded and which is used to investigate a variety of topics, like, e.g., radon, (Bostrom, et al., 1992) breast implants (Byram et al., 2001), transmission deregulation (Gregory, Fischhof, Thorne & Butte, 2003), disease inherintance, (Henderson & Maguire, 2000) and global climate change (Read, Bostrom, Granger Morgan, Fischhof & Smuts, 1994). The Mental Models Approach combines scientific and individual truths which are both crucial in developing successful risk communication strategies (Byram, et al., 2001). Therefore, the results of this study prove to be well founded and are reproducible.

This study is unique in its way, because the research topic has never been investigated in this way before. Brinsley et al. (2007) examined the general public's awareness, knowledge and perceptions of MRSA, by using focus groups, so their study was qualitative. This study was conducted using a combination of qualitative and quantitative methods. Thus, the results of our investigation concerning MRSA are more likely to be generalized, than the results of the study of Brinsley et al. (2007), because our study tested the findings of the interviews, by conducting a questionnaire among a large sample.

Furthermore, the results of this investigation offer important practical assistance for developing communication strategies. Other studies investigating this subject did not offer such a practical value. Specifically, the findings of this study can be used to determine the

content of the communication means, aimed at providing information concerning MRSA, based on the recommendations done in chapter 5. Consequently, this study can contribute to the provision of information concerning the MRSA issue, by giving concrete indications of the contents of the communication.

Moreover, when implementing the findings of this research for development of communication strategies, afterwards, the effects of the intervention can be evaluated by using the developed expert model and questionnaire, in order to establish any changes concerning the lay mental model.

6.2 LIMITATIONS

Although the research is conducted, according to a well founded method, some limitations can be recognized. The method is not perfect, considering the processing of the gathered information. A concrete way of processing the data, for example, how to convert the data from the confirmatory questionnaires into a lay mental model, is not offered, merely some suggestions. Furthermore, the method recommends asking initially for MRSA beliefs, and when this does not produce recall, the term should be explained. This indeed produces often the desired recognition, but it does not allow for distinguishing between respondents who got triggered by the term MRSA and the respondents who got triggered by explaining the term a little more. Thus, the questionnaire does not provide information about the amount of respondents familiar with the term MRSA and the number of respondents who needed more information concerning the expression. Overall, the Mental Models method of Granger Morgan et al. (2001) proved to be satisfactory.

Considering the expert model of MRSA, it was the first time such a model was invented for this topic, so, despite of all efforts, the model can not expected ro be perfect. The review of the model was done by a medical microbiologist, but it might be better to choose experts of more areas for reviewing the model, for example experts of infectious diseases, infection control nurses, or former MRSA-patients, in order to create a broader overview. This was tried to achieve in this research, but unfortunately failed.

Concerning the mental models interviews, there are also some limitations. The interviews were conducted among inhabitants of only one province of the Netherlands, namely; Friesland. This might have caused bias regarding the questionnaire, since the questionnaire was based on the results of the interviews. The mental models interview phase, consists formally out of two parts; mental models interviews and a picture sorting task. This picture sorting task is usually conducted in order to reveal information participants did not think of to mention, because nothing triggered that part of their memory (Granger Morgan et al., 2001). The task involves a set of 50 pictures showing a cross section of human life and activities, half of them relating the topic of research and half of them not (Granger Morgan et al., 2001). It was chosen not to implement the picture sorting task, because it is possible to

induce inferences and it would take much time of the participant, together with the interview. However, it might have produced additional non-expert beliefs.

The confirmatory questionnaires also included some restrictions. Despite of the efforts made to obtain a representative sample of the general Dutch public, this did not succeed completely. Inhabitants of some provinces were underrepresented, for example Zuid-Holland (0,8%), and inhabitants of Zeeland were even missing. Inhabitants of the province Noord-Brabant were overrepresented compared to other provinces (23,4% of the total sample). It turned out that the train does transport the expected diverse public. In proportion, there were many scholars and students, which can also be seen in the mean age (30,67 years).

It was also tried to reveal the different ethnicities present in the Dutch population, by asking their nationality and the nationality of their parents. This turned out to be a wrong question, as people can acquire a Dutch nationality in time, and moreover may have two nationalities. A better question might have been 'country of birth' and then the same question concerning the parents.

Concerning the questions; it might be that some questions were interpreted incorrectly, or were formulated in the wrong way. For example, the proposition considering disinfection measures, which was related to the treatment of MRSA-positive patients in the expert model, but it could be interpreted as a prevention measure. The same holds for the questions concerning 'contamination.' One cannot state that the public is really aware of the differences between colonization and infection, due to the formulation of the questions. These problems with the formulation originate from the intention not to give too much information, but instead, there is probably given too little information to answer the question, the way it was meant. As a consequence, this all might have caused bias.

The present knowledge of the general Dutch public concerns little MRSA-specific information, but is applicable to several health treats. For example, having a weakened immune system is a risk factor for practically every health treat. That MRSA can be found in the blood is another example. Many respondents were aware of this (49,2%), but the MRSA-specific answers, hair (5,9%), skin (15,9%) and mucous membranes (29,3%) were not that commonly known. That implies that the respondents might have just guessed some answers, because they also apply to other health threats. This suggests that the public does even know less about MRSA than the results imply.

It should also be taken into consideration, that many respondents answered 'do not know' during the confirmatory questionnaires. The lay mental model is based on the confirming answers, because the lay mental model represents what people do seem to know and think about MRSA.

The results of the confirmatory questionnaires did not allow for statistical analyses, because of the small sample sizes of the subgroups, but reveal the most important beliefs and views of the general Dutch public concerning MRSA.

6.3 FUTURE RESEARCH

Future research should be aimed at developing a communication intervention to improve the knowledge of the general Dutch public concerning MRSA, because it appears from this study that people have varied misconceptions, and that they miss essential information concerning MRSA. This can be done, according the indications given in this research and by using the Mental Models Approach of Granger Morgan et al (2001). Their method offers a detailed guide for development and evaluation of communication means.

Since the prevalence of MRSA in other countries, than the Netherlands, Denmark, Sweden, and Norway, for example, our neighbour countries Belgium and Germany, is much higher, according to the Health Council of the Netherlands (2006), this investigation might also be conducted over there. The lay mental models of the general public of different countries then can be compared, to examine whether different beliefs exist concerning MRSA.

Another possibility for future research might be whether the information provided on MRSA contributed to the experienced stress and coping levels of the general Dutch public concerning MRSA. It might also be interesting to investigate whether this information provision concerning MRSA reduces the experienced stress and coping levels of hospitalized general Dutch public, and if it promotes compliance of general Dutch public with the infection control measures taken in the hospital to avoid the spread of MRSA, like for example, hygiene precautions or barrier nursing.

In future, it might also be interesting to investigate the mental models of certain target groups. One can think, for example, about hospitalized patients or farmers; people, who are expected to be confronted with MRSA and therefore might know more about the topic. In chapter four some additional analyses have been performed concerning this topic. These indicate that there are differences between the mental models of inhabitants of Noord-Brabant and people who do not live in Noord-Brabant. This might be interesting for further investigation.

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APPENDIX

Appendix 1: Expert model

Appendix 2: Interview scheme

Appendix 3: Expert model with added non-expert beliefs

Appendix 4: Questionnaire

Appendix 5: Characteristics of the sample

Appendix 6: Lay mental model

APPENDIX 1: EXPERT MODEL

Expert Model

On the next page, the expert model (fig. 1) can be found.

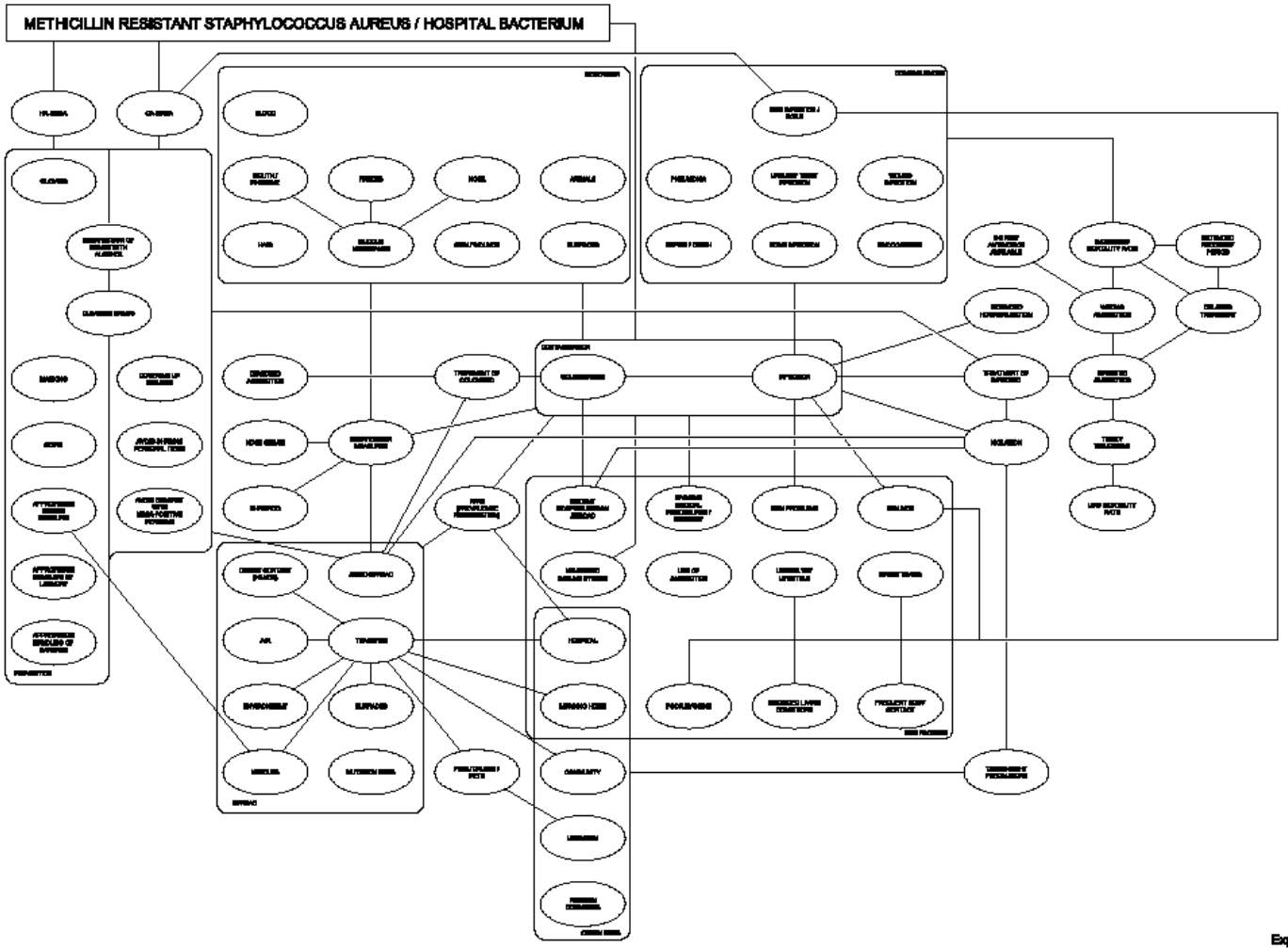

Figure 1
Expert model

APPENDIX 2: INTERVIEW SCHEME

Interview scheme

On the next page, the interview scheme can be found.

Leeftijd:	……
Geslacht:	Man / Vrouw (omcirkelen wat van toepassing is)
Hoogst genoten opleiding:	……
Nationaliteit:	……
Nationaliteit ouders:	……

Basis opmerkingen

- Verder nog iets?
- Kun je me er meer over vertellen?
- Verder nog iets, het maakt niet uit of het goed of fout is, vertel maar gewoon wat er in je opkomt.
- Kun je uitleggen waarom?

Vragen in volgorde

1. Heb je ooit gehoord van de term MRSA? Kun je je er iets over herinneren?
2. Eens kijken of ik je geheugen een beetje kan helpen. MRSA wordt ook wel de ziekenhuisbacterie genoemd. Helpt dat een beetje?
3. Oké, ik zal je nog een beetje helpen. MRSA kan een gezondheidsrisico vormen voor mensen die het bij zich dragen.

__ **Soorten MRSA**

__ Kun je me meer vertellen over deze soorten MRSA?

__ **Besmetting**

__ Kun je me meer vertellen over MRSA besmetting?

*__ Je vertelde over de verschillende vormen van besmetting, kun je daar iets meer over vertellen?

__ **Preventie**

__ Kun je me meer vertellen over hoe je MRSA kunt voorkomen?

*__ Je vertelde over de verschillende soorten MRSA, maakt dat nog iets uit voor de preventie?

__ **Reservoir**

__ Kun je me meer vertellen over waar MRSA voorkomt?

__ **Verspreiding**

__ Kun je me meer vertellen over de verspreiding van MRSA?

*__ Je vertelde over de verschillende soorten MRSA, maakt dat nog iets uit voor de verspreiding?

__ **Desinfectie-maatregelen**

__ Kun je me meer vertellen over de desinfectie-maatregelen?

__ **Consequenties**

__ Kun je iets meer vertellen over de gevolgen van MRSA besmetting?

*__ Je vertelde over de verschillende soorten MRSA, maakt dat nog iets uit voor de consequenties?

__ **Herkomst**

__ Kun je iets meer vertellen over de herkomst van MRSA?

__ **Risicofactoren**

__ Kun je me iets meer vertellen over de risicofactoren?

*__ Je vertelde over de verschillende soorten MRSA, maakt dat nog iets uit voor de risicofactoren?

*__ Kun je me meer vertellen over het risico recente buitenlandse ziekenhuisopname en het krijgen van een MRSA besmetting?

*__ Kun je me meer vertellen over hoe zwakke gezondheid een risico vormt voor het krijgen van een MRSA besmetting?

*__ Kun je me meer vertellen over hoe invasieve technieken een risico vormen voor het krijgen van een MRSA besmetting?

*__ Kun je me meer vertellen over hoe wonden een risico vormen voor het krijgen van een MRSA besmetting?

*__ Kun je me meer vertellen over hoe huidaandoeningen een risico vormen voor het krijgen van een MRSA besmetting?

*__ Kun je me meer vertellen over hoe slechte hygiëne een risico vormt voor het krijgen van een MRSA besmetting?

*__ Kun je me meer vertellen over hoe drukke leefomstandigheden een risico kunnen vormen voor het krijgen van een MRSA besmetting?

*__ Kun je me meer vertellen over hoe huid-op-huid contact een risico vormt voor het krijgen van een MRSA besmetting?

*__ Kun je me meer vertellen over hoe het ziekenhuis een risico vormt voor het krijgen van een MRSA besmetting?

*__ Kun je me meer vertellen over hoe een verpleeghuis een risico vormt voor het krijgen van een MRSA besmetting?

__ **Behandeling**

__ Kun je me iets meer vertellen over de behandeling van MRSA besmetting?

*__ Je vertelde over de verschillende soorten MRSA, maakt dat nog iets uit voor de behandeling?

__ **Risicobeoordeling en management**

__ Waar heb je gehoord of gelezen over MRSA risico's?

__ Waar heb je gehoord over de dingen die je kunt doen om de risico's betreffende MRSA te beheersen?

__ Is er een manier om erachter te komen of je MRSA hebt?

__ Als iemand besmet is met MRSA, is er dan iets wat ze er aan kunnen doen?

__ **Risicovergelijkingen (eind vragen)**

__ Is MRSA echt een risico voor de samenleving of is het zo'n risico dat niet zo belangrijk is?

__ Kun je me een beetje een idee geven hoe het risico van MRSA te vergelijken valt met andere risico's, bijvoorbeeld roken?

__ **Persoonlijk risico (eind vragen)**

__ Wat kun je me vertellen over MRSA wat betreft jezelf?

__ Heb je een reden om te denken dat jouw eigen risico op MRSA groot of klein is? Kun je me uitleggen waarom?

__ Heb je ooit laten onderzoeken of je MRSA had? Kun je vertellen waarom of waarom niet? Heb je er ooit aangedacht om het te laten doen?

__ Hebben familie of vrienden van jou ooit te maken gehad met MRSA? Hebben ze zich bijvoorbeeld laten onderzoeken o.i.d.?

APPENDIX 3: EXPERT MODEL WITH ADDED NON-EXPERT BELIEFS

Expert model with added non-expert beliefs

On the next page, the expert model with added non-expert beliefs (fig 2.), emerged from the interviews, can be found.

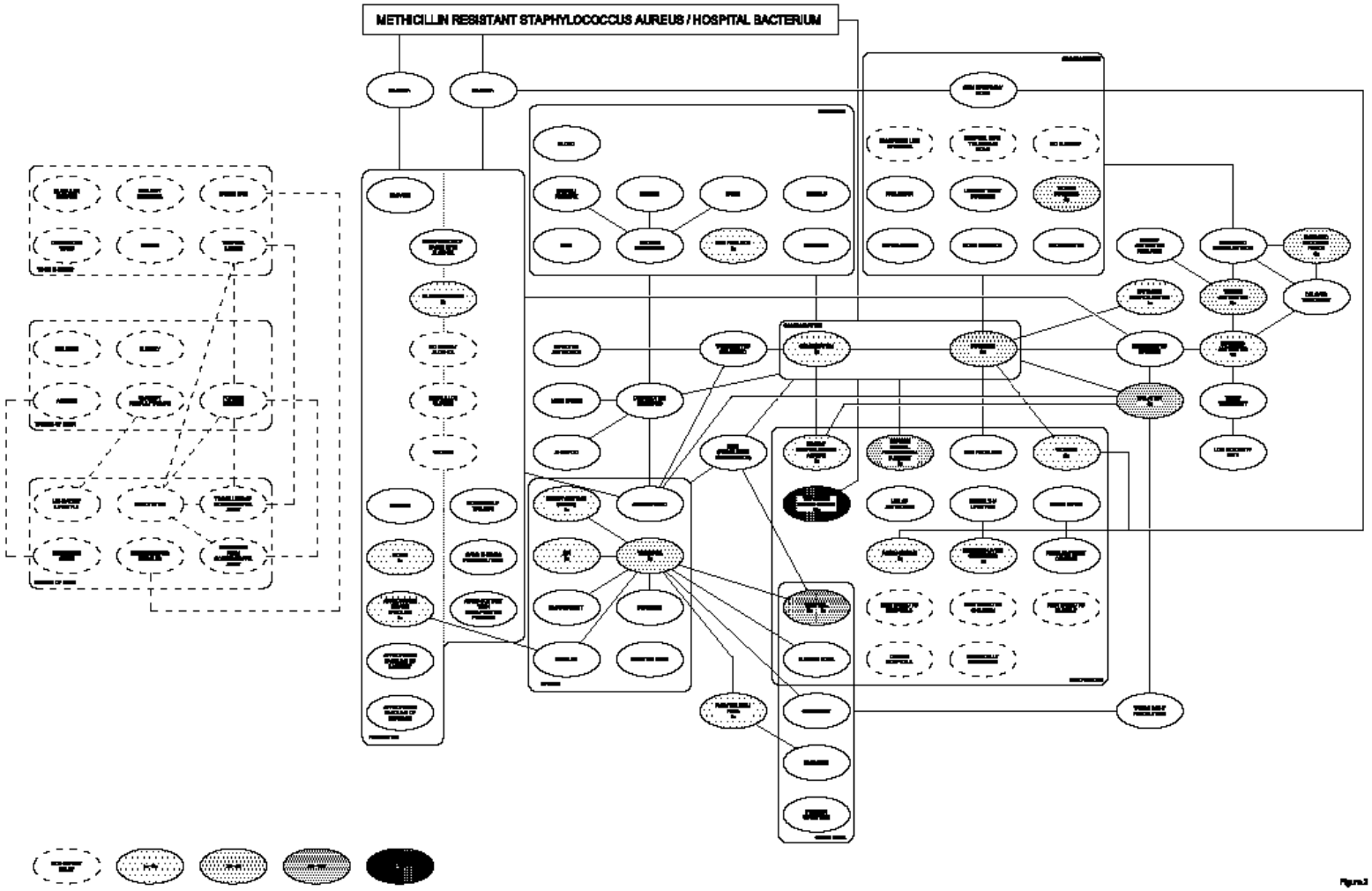

Figure 3
Expert model with added non-expert beliefs

APPENDIX 4: QUESTIONNAIRE

Questionnaire

The original questionnaire can be found on the next page.

Universiteit Twente
de ondernemende universiteit

Deze vragenlijst is onderdeel van een onderzoek van de Universiteit Twente naar de ideeën van de Nederlandse bevolking over MRSA. Ook als u niets weet over dit onderwerp, mag u de vragenlijst invullen.

Het is de bedoeling dat u bij iedere vraag het antwoord geeft dat het beste overeenkomt met uw eigen ideeën. Er zijn in deze vragenlijst geen foute antwoorden mogelijk. Alle informatie is belangrijk en nuttig voor ons onderzoek.

Uw antwoorden zullen anoniem blijven. U hoeft in deze vragenlijst nergens uw naam in te vullen.

Het is belangrijk om de vragenlijst pagina voor pagina in te vullen. Het is dus **niet** de bedoeling om vooruit te bladeren of om terug te bladeren naar eerder ingevulde pagina's.

De vragenlijst bestaat uit 3 onderdelen. Het invullen kost ongeveer 10 à 15 minuten.

Leest u alstublieft de instructies voorafgaand aan de vragen goed door.

ALVAST HARTELIJK DANK VOOR UW MEDEWERKING!

DEEL I

Geef voor de volgende stellingen aan in hoeverre u denkt dat deze waar zijn. Omcirkel het antwoord van uw keuze.

ANTWOORDMOGELIJKHEDEN

1	Voorzover ik weet is deze stelling waar.
2	Ik denk dat deze stelling waarschijnlijk waar is.
3	Ik heb geen idee of deze stelling waar of niet waar is.
4	Ik denk dat deze stelling waarschijnlijk niet waar is.
5	Voorzover ik weet is deze stelling niet waar.

Wat is MRSA?	WAAR				NIET WAAR
1. MRSA is een spierziekte.	1	2	3	4	5
2. MRSA is een andere term voor muisarm.	1	2	3	4	5
3. MRSA is een aandoening aan het immuunsysteem.	1	2	3	4	5
4. MRSA is een ziekte.	1	2	3	4	5
5. MRSA is een tropische ziekte.	1	2	3	4	5
6. MRSA is een besmettelijk virus.	1	2	3	4	5

Wie krijgt MRSA?	WAAR				NIET WAAR
7. MRSA komt vooral voor bij verslaafden (drugs, alcohol, etc.).	1	2	3	4	5
8. MRSA komt vooral voor bij onverzorgde mensen, bijvoorbeeld zwervers.	1	2	3	4	5
9. MRSA komt vooral voor bij oudere mensen.	1	2	3	4	5
10. MRSA komt vooral voor bij kinderen.	1	2	3	4	5
11. MRSA komt vooral voor bij vreemde volkeren.	1	2	3	4	5

Wat zijn de oorzaken van MRSA?	WAAR				NIET WAAR
12. MRSA wordt overgebracht door insectenbeten.	1	2	3	4	5
13. MRSA wordt veroorzaakt door overbelasting van de spieren.	1	2	3	4	5
14. MRSA wordt veroorzaakt door een ongezonde levensstijl.	1	2	3	4	5
15. MRSA wordt veroorzaakt door drank en / of drugsgebruik.	1	2	3	4	5
16. MRSA is in Nederland gekomen door reizigers naar verre landen.	1	2	3	4	5
17. MRSA is in Nederland gekomen door immigranten uit verre landen.	1	2	3	4	5

ALS U ALLE VRAGEN BEANTWOORD HEEFT, KUNT U DE VOLGENDE PAGINA INVULLEN.

DEEL II

Lees de tekst in het onderstaande grijze blok goed door en geef vervolgens voor de volgende stellingen aan in hoeverre u denkt dat deze waar zijn. Omcirkel het antwoord van uw keuze.

MRSA WORDT OOK WEL DE ZIEKENHUISBACTERIE GENOEMD.
MRSA KAN EEN RISICO VOOR DE GEZONDHEID VORMEN.

ANTWOORDMOGELIJKHEDEN

1	Voorzover ik weet is deze stelling waar.
2	Ik denk dat deze stelling waarschijnlijk waar is.
3	Ik heb geen idee of deze stelling waar of niet waar is.
4	Ik denk dat deze stelling waarschijnlijk niet waar is.
5	Voorzover ik weet is deze stelling niet waar.

		WAAR				NIET WAAR
1.	Iemand die nooit in het ziekenhuis komt, krijgt geen MRSA.	1	2	3	4	5
2.	MRSA kan een infectie veroorzaken.	1	2	3	4	5
3.	MRSA komt voor onder de algemene bevolking.	1	2	3	4	5
4.	Iemand met MRSA moet in quarantaine.	1	2	3	4	5
5.	MRSA verspreidt zich door direct contact.	1	2	3	4	5
6.	Er bestaan diverse behandelingen voor MRSA.	1	2	3	4	5
7.	Alleen kinderen kunnen MRSA krijgen.	1	2	3	4	5
8.	MRSA komt voor in de slijmvliezen, zoals de darmen, neus- en keelholte.	1	2	3	4	5
9.	MRSA komt voor in het bloed.	1	2	3	4	5
10.	Bloedonderzoek kan uitwijzen of iemand MRSA heeft.	1	2	3	4	5
		WAAR				NIET WAAR
11.	Iemand met MRSA kan niet worden geopereerd.	1	2	3	4	5
12.	MRSA is een ziekenhuisbacterie en vormt dus geen gevaar voor de maatschappij.	1	2	3	4	5
13.	MRSA wordt onder andere bestreden met desinfectie-maatregelen.	1	2	3	4	5
14.	MRSA kan alleen bestreden worden met bepaalde antibiotica.	1	2	3	4	5
15.	MRSA verspreidt zich door de lucht.	1	2	3	4	5
16.	MRSA komt voor in het haar.	1	2	3	4	5
17.	Een zwakke weerstand, of slechte gezondheid vergroot de kans op MRSA.	1	2	3	4	5
18.	MRSA komt alleen in ziekenhuizen voor, bijvoorbeeld op operatiekamers.	1	2	3	4	5
19.	Een operatie vergroot de kans op MRSA.	1	2	3	4	5
20.	De ene persoon is veel vatbaarder voor MRSA dan de ander.	1	2	3	4	5

ALS U ALLE VRAGEN BEANTWOORD HEEFT, KUNT U DE VOLGENDE PAGINA INVULLEN.

	WAAR					NIET WAAR
21. Verblijf in een verpleegtehuis vergroot de kans op MRSA.	1	2	3	4	5	
22. Slechte hygiëne vergroot de kans op MRSA.	1	2	3	4	5	
23. Mensen die veel buiten (in de natuur) zijn, kunnen geen MRSA krijgen.	1	2	3	4	5	
24. Iedereen heeft evenveel kans om MRSA te krijgen.	1	2	3	4	5	
25. MRSA verspreidt zich mogelijk van dier op mens.	1	2	3	4	5	
26. Een recente buitenlandse ziekenhuisopname vergroot de kans op MRSA.	1	2	3	4	5	
27. Iemand kan MRSA bij zich dragen zonder er ziek van te worden.	1	2	3	4	5	
28. MRSA verspreidt zich door de omgeving.	1	2	3	4	5	
29. Met veel mensen dicht op elkaar wonen, vergroot de kans op MRSA.	1	2	3	4	5	
30. MRSA begint met hoge koorts, net als griep.	1	2	3	4	5	
	WAAR					NIET WAAR
31. Een huidaandoening, bijvoorbeeld eczeem, vergroot de kans op MRSA.	1	2	3	4	5	
32. MRSA kan een dodelijke afloop hebben.	1	2	3	4	5	
33. Mensen die niet roken of drinken kunnen geen MRSA krijgen.	1	2	3	4	5	
34. Mensen kunnen immuun zijn voor MRSA.	1	2	3	4	5	
35. Alleen oude mensen kunnen MRSA krijgen.	1	2	3	4	5	
36. MRSA komt voor in verpleegtehuizen.	1	2	3	4	5	
37. MRSA kun je niet voorkomen door een goede hygiëne.	1	2	3	4	5	
38. Een recente buitenlandse ziekenhuisopname is reden voor quarantaine.	1	2	3	4	5	
39. Open wonden vergroten de kans op MRSA.	1	2	3	4	5	
40. MRSA komt ook voor bij vee, zoals varkens en kalveren.	1	2	3	4	5	
	WAAR					NIET WAAR
41. Iemand met MRSA moet langer in het ziekenhuis blijven dan normaal.	1	2	3	4	5	
42. MRSA komt voor in ziekenhuizen.	1	2	3	4	5	
43. Iemand mag pas het ziekenhuis verlaten als hij / zij geen MRSA meer heeft.	1	2	3	4	5	
44. Een behandeling of opname in het ziekenhuis vergroot de kans op MRSA.	1	2	3	4	5	
45. Huid op huid contact vergroot de kans op MRSA.	1	2	3	4	5	
46. De meeste antibiotica werken niet tegen MRSA.	1	2	3	4	5	
47. Bij een tijdige behandeling van MRSA is de sterftekans laag.	1	2	3	4	5	
48. MRSA komt voor op de huid.	1	2	3	4	5	
49. Injectie met een vaccin kan MRSA voorkomen.	1	2	3	4	5	
50. In bepaalde ziekenhuizen komt MRSA steeds terug, alsof het nooit echt weg is geweest.	1	2	3	4	5	

ALS U ALLE VRAGEN BEANTWOORD HEEFT, KUNT U DE VOLGENDE PAGINA INVULLEN.

DEEL III

Geef voor de volgende stellingen aan in hoeverre u het met ermee eens bent. Omcirkel het antwoord van uw keuze.

ANTWOORDMOGELIJKHEDEN

1	Ik ben het helemaal eens met deze stelling.
2	Ik ben het gedeeltelijk eens met deze stelling.
3	Ik heb geen mening over deze stelling.
4	Ik ben het gedeeltelijk oneens met deze stelling.
5	Ik ben het helemaal niet eens met deze stelling.

	EENS				ONEENS
1. Ik denk dat MRSA een risico voor de samenleving is.	1	2	3	4	5
2. Ik denk dat mijn risico op MRSA vergeleken bij anderen klein is.	1	2	3	4	5
3. Ik ervaar MRSA niet als een bedreiging voor mijn gezondheid.	1	2	3	4	5
4. Als ik nooit in het ziekenhuis kom, krijg ik geen MRSA.	1	2	3	4	5

Kruis het antwoord aan dat op u van toepassing is.

5. Waar heeft u eerder gehoord of gelezen over MRSA? (meerdere antwoorden mogelijk)

☐ Ik heb nooit eerder gehoord of gelezen over MRSA.
☐ Televisie.
☐ Radio.
☐ Kranten.
☐ Internet.
☐ Via familie, vrienden of kennissen.
☐ Anders, namelijk ……

6. Hoe zou u uw gezondheid over het afgelopen jaar willen beschrijven?

☐ Slecht
☐ Matig
☐ Redelijk
☐ Goed
☐ Uitstekend

7. Bent u in het afgelopen jaar opgenomen geweest in een ziekenhuis?

☐ Ja
☐ Nee

ALS U ALLE VRAGEN BEANTWOORD HEEFT, KUNT U DE VOLGENDE PAGINA INVULLEN.

8. Hebben familie en / of vrienden van u te maken gehad met MRSA?

☐ Ja

☐ Nee

Zo ja, kunt u hier iets over vertellen?

……

……

……

9. Heeft u zelf te maken gehad met MRSA?

☐ Ja

☐ Nee

Zo ja, kunt u hier iets over vertellen?

……

……

……

10. Wat is uw hoogst voltooide opleiding? (of komt daar het dichtst bij in de buurt?)

☐ Basisschool ☐ MBO

☐ VMBO (VBO, MAVO) ☐ HBO

☐ HAVO ☐ Universiteit

☐ VWO

11. Wat is uw geslacht? ☐ Man

☐ Vrouw

12. Wat is uw leeftijd? ……

13. Wat is uw nationaliteit? ……

14. Wat is de nationaliteit van uw ouders? Vader: ……

Moeder: ……

15. Wat is uw beroep? ……

16. In welke provincie woont u? ……

Als u nog vragen of opmerkingen heeft over deze vragenlijst en / of het onderzoek dan kunt u dat hieronder kwijt.

……

……

……

HARTELIJK DANK VOOR UW MEDEWERKING!

APPENDIX 5: CHARACTERISTICS OF THE SAMPLE

Characteristics of the sample

Table 14
Characteristics of the sample

Variable	N (239)	Percentage / S.D.
Sex		
Male	110	46%
Female	129	54%
Mean Age	30,67 years	15,97 years
Male	30,53 years	15,93 years
Female	30.78 years	16,07 years
Nationality		
Dutch	230	96,2%
Other	9	7,8%
Nationality Father		
Dutch	217	90,8%
Other	22	9.2%
Nationality Mother		
Dutch	218	91,2%
Other	21	8,8%
Level of Education		
Elementary School	6	2,5%
VMBO	18	7,5%
HAVO	26	10,9%
VWO	46	19,2%
MBO	49	20,5%
HBO	61	25,5%
University	33	13,8%
Province of Residence		
Friesland	23	9,6%
Groningen	12	5%
Drente	9	3,8%
Overijssel	46	19,2%
Gelderland	22	9,2%
Limburg	24	10%
Noord-Brabant	56	23,4%
Zeeland	-	-
Zuid-Holland	2	0,8%
Noord-Holland	29	12,1%
Utrecht	11	4,6%
Flevoland	3	1,3%
Abroad	2	0,8%
Health Condition during the past year		
Bad	1	0,4%
Moderate	12	5,%
Fair	36	15,1%
Good	129	54%
Excellent	61	25,5%
Admission to the hospital during the past year?		
Yes	25	10,5%
No	214	89,5%
Did family or friends of yours have had anything to do with MRSA?	22	9,2%
Yes	217	90,8%
No		
Did you have had anything to do with MRSA ever?		
Yes	8	3,3%
No	231	96,7%

APPENDIX 6: LAY MENTAL MODEL

Lay mental model

On the next page, the lay mental model (fig. 3) can be found.

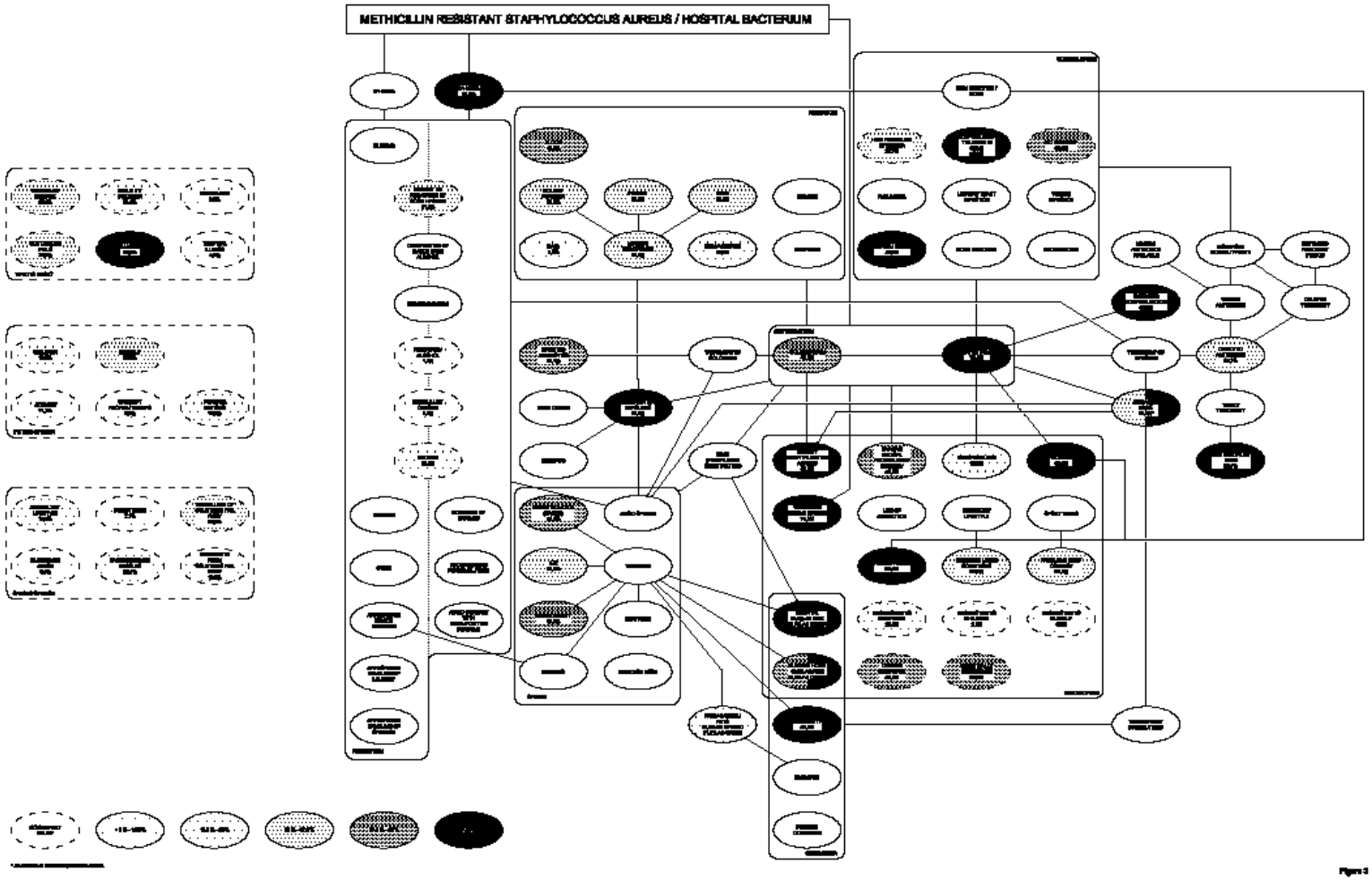

Figure 3
Lay mental model