Hospital Workers' Experiences with Antimicrobial Resistance: Differences between Nurses and Physicians

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1. Abstract

Background. Antimicrobial Resistance (AMR) has been an ever-growing problem, especially in the health care sector. Health care workers are significant people in working with and limiting AMR as best as possible through Antibiotic Stewardship Programs (ASPs) and by following Infection Prevention Control (IPC) policies. However it has been found guidelines are not adhered to and followed correctly everywhere by nurses and physicians. Therefore, this paper will research: 'Are there differences in experiences with ASP and IPC between nurses and physicians considering AMR?'.

Method. A survey design was used by administering the online survey '*Antimicrobial Resistance & Infection Control*' to hospital workers from Germany and the Netherlands. In order to find relevant scales for this study, exploratory factor analyses (EFA) were done on the items, after which Mann-Whitney U tests were performed to test for differences between nurses and physicians. In addition, the open question regarding ASP improvements was explored and coded according to the topics of the questionnaire, with inductive coding adding two additional topics.

Results. The final sample consisted of $n = 397$ nurses and $n = 177$ physicians. EFA showed seven scales with high internal consistencies ($\alpha \geq 0.7$). The found scales seemed to measure experiences with ASPs, outbreak management, diagnostics, logistics, support from colleagues/supervisors, experiences with the degree to which AMR is problematic, and importance regarding the AMR problem. A significant difference ($p<0.05$) was found between nurses and physicians on experiences with ASPs, diagnostics, outbreak management and AMR is problematic. Physicians scored higher on the first three mentioned scales, meaning they had more positive experiences with these aspects, whereas nurses scored higher on AMR is problematic, meaning they think AMR is more problematic in comparison to physicians. In total, eight codes were found when exploring differences in improvements. The results showed that similarities are seen between nurses and physicians regarding desired improvements in the clarity of infection control policies. Whereas differences could also be identified, since nurses focused on the availability of single and isolated rooms, while physicians focused more on communication transparency.

Conclusion. Recommendations for future research are to see how ASPs can be improved when also involving nurses in the development process of those. In addition, practically seen, national infection prevention control policies should be established and applied similarly through all hospitals in the Netherlands.

2. Content

3. Introduction

Antibiotic drugs have been extremely helpful in the past and still, in the present. Especially during and after the second World War, when penicillin was introduced to curing many people with bacterial infections (Ventola, 2015). However, resistance against this drug emerged some years later, because of the great amount of drugs used on the great amount of people. A broader term, antimicrobial resistance (AMR) is related to this, and can be defined as ''encompassing resistance to drugs to treat infections caused by other microbes as well, such as parasites (e.g. malaria), viruses (e.g. HIV) and fungi (e.g. Candida)'' (World Health Organization Regional Office for the Eastern Mediterranean [WHO EMRO], 2019, whole page). The problem of resistance has become ever-growing, especially in the health-care sector, where drugs are used continuously. Even though the problem is relatively small in the Netherlands (Rijksinstituut voor Volksgezondheid en Milieu [RIVM], 2018a), within the health-care sector globally it leads to one billion euros in expenses every year (European Centre for Disease Prevention and Control [ECDC], 2018). In addition, 8.9 million bacterial infections occur in health- and permanent care yearly, and 33.000 people in Europe die annually from bacterial infections unable to be treated due to resistance. Following, it was found that ''70% of pathogens in US hospitals have developed resistance to at least 1 antimicrobial'' (Giblin et al., 2004, p. 1).

There are many factors that play a significant role in the development of AMR. Especially important seems to be exposure to antimicrobials in either hospital settings, the environment or agriculture (Holmes et al., 2015). Related to this is that clinicians rather 'overtreat' people in terms of antibiotics, to make sure all aspects of the patient's illness get treated (Giblin et al., 2004; Hulscher, Grol & van der Meer, 2010; Ventola, 2015). Another major cause is the misuse or incorrect use of antibiotics. There are different ways this happens, for example: the incorrectly prescribing of drugs (Giblin et al., 2004; Holmes et al., 2015; Ventola 2015), the patients' incorrectly taking of the antibiotics, by for example quitting before recommended, or taking drugs once a day instead of two or three times (ECDC, n.d.). Looking at the consequences of AMR, De Kraker, Davey & Grundmann (2011) did a study on two types of resistant organisms (*Escherichia coli and Staphylococcus aureus*), which are the two main sources of bloodstream infections in the world. They found that due to these organisms being resistant, the hospital stay of in-patients gets extended by a great period of time and mortality rates amongst these people are higher. This puts a burden on hospitals, because costs for treating patients are increasing. Moreover, new antibiotics will have to be invented to prevent infectional diseases, but it has been made substantially more

difficult to get those on the market (Ventola, 2015). Additionally, when bacteria get resistant against drugs, they will keep living and increasing in number, thus people stay ill or might die (World Health Organization [WHO], 2018). If people stay ill for a prolonged period of time, this results in illnesses getting progressively risky, and the danger of spreading diseases amongst people easier.

The Centers for Disease Control and Prevention (CDC) is an American governmental institution, who continuously tries to prevent AMR through several methods (CDC, 2019). Important interventions proposed by the CDC are Antibiotic Stewardship Programs (ASPs), which are policies for hospitals to improve the use of antibiotics (Pollack & Srinivasan, 2014), and to use antibiotics more consciously (Ohl & Ashley, 2011). An important program to follow alongside ASP is infection prevention control (IPC) (Manning et al., 2018), which is defined as ''a scientific approach and practical solution designed to prevent harm caused by infection to patients and health workers'' (WHO, n.d., Infection Prevention and Control section, para. 1). For hospitals in the Netherlands, national IPC guidelines by WIP (Working Group of Infection Prevention) (RIVM, 2018b) and ASP suggestions by SWAB (Antibiotic Policy Working Group Foundation) (Stichting Werkgroep Antibioticabeleid, 2019) have been established.

Guidelines regarding ASP and IPC have been implemented in many hospitals around the world, and have especially reduced the amount of antibiotics used on patients (Ohl & Ashley, 2011). In contrast to that, Hulscher et al. (2010) found that the degree to which the guidelines are implemented in organisations differs to a reasonable extent, even within the same country. When looking at the Netherlands, ASP and IPC guidelines are available, but every hospital has their own IPC committee who applies policies and rules differently. Thus, even though IPC plays such an important role in safeguarding policies and protection in healthcare, intervention programs have not always been similarly effective in different settings. A reason for this can be that health-care settings have differing organisational cultures, in which they have their own collective attitudes, beliefs and values which are significant to them in their organisation (De Bono, Heling & Borg, 2014).

Within health-care, nurses play a significant role in carrying out ASP and IPC tasks: they are the people that effectively enact on almost all ASP and IPC guidelines (Elder, Brungs, Nagy, Kudel & Render, 2008; Olans, Olans & DeMaria Jr., 2016; Wentzel et al., 2014). From the moment a patient arrives at the hospital, nurses are instantly involved in decision-making processes in terms of isolation of the patient, a decision which could later be reviewed by microbiologists or infection

preventionists (Olans et al., 2016). This is followed by 'medication allergy history checks', in which nurses sometimes need to have gained additional knowledge related to combinations of allergies and medication use. After this, physicians prescribe antibiotics, while in theory also being responsible for ordering and regulating the use of the antibiotics (Olans et al., 2016; Wentzel et al., 2014). In reality, nurses perform these tasks, while simultaneously monitoring the effect the drugs have on the patient. It has been found physicians work under time restraints, which means they are unable to do some of the ascribed ASP tasks (Edwards, Drumright, Kiernan & Holmes, 2010). This leads to nurses having to be a primary force of interaction between all facets of a patient's care (Olans et al., 2016). Hence, communication of nurses is an important part of ASP and IPC guidelines being performed accordingly.

Even though nurses play a crucial role in carrying out ASP guidelines, they are not, or least recognised with being involved in formulation and implementation of these (Edwards et al., 2010; Olans et al., 2016). This means they are less acknowledged than for example: physicians, microbiologists, or pharmacists. In addition, when considering IPC, not all nurses perceive infection to be a problem for their patient safety, but only consider the environment, medication and management to be an issue (Elder et al., 2008). When nurses do acknowledge IPC, it has been found they have to take care of too many patients at the same time, which results in them following IPC protocols to a lesser extent (Giblin et al., 2004). In addition to that, an important source of the not carrying out of ASP tasks properly is that clinicians (i.e. nurses and physicians) only perceive AMR to occur at a national level, but not at their own practice, which leads to ''lack of perceived susceptibility among clinicians'' and ''lack of awareness and understanding regarding the problem'' (Giblin et al., 2004, p. 1666). This might mean that clinicians do not acknowledge the problem of AMR appropriately. Additionally, they place the responsibility they do perceive in having on preventing AMR on extrinsic prevention determinants (the public, or agriculture), and on organisational determinants about which they say to have definite authority (Giblin et al., 2004). Additionally, within a professional culture, hierarchical layers play an important role in which people are unsure which person or guidelines to follow, making it substantially more difficult to set clear rules within a hospital setting (De Bono et al., 2014). Hierarchy layers can also be related to the fact that every subgroup working in a hospital (e.g., nurses and physicians) have their own collective attitudes, beliefs, and values as a group towards IPC. This means they act accordingly to their group's objectives, and thus not always follow the guidelines as they are supposed to (De Bono et al., 2014).

Applying these issues within the health-care culture to the increasing AMR problem, without having short-term solutions at hand (new antibiotics), it is important to know the way health-care workers behave towards, and perceive ASP and IPC from their point of view. The health-care workers are especially important in this, since they can influence the quality of implemented ASP and IPC policies through their day-to-day work (Olans et al., 2016). Therefore, it will be interesting to explore the experiences of different kinds of health-care workers (nurses and physicians) considering ASP and IPC, and to examine their view on enhancement of ASP/IPC strategies. In this study, the definition of experience will be as follows: ''The present content of consciousness'' (Pam, 2013), meaning the direct understanding and involvement someone has in a situation. The main research question of this paper is: 'Are there differences in experiences with ASP and IPC between nurses and physicians considering AMR?'. To answer this question, three sub-questions will be used:

1. Are there differences between nurses and physicians regarding experiences with ASP and IPC?
2. What suggested improvements have nurses and physicians specified to the stewardship programs?
3. What differences can be explored in these suggested improvements between nurses and physicians?

4. Method

4.1. Design

This study used a survey design in combination with both quantitative and qualitative questioning. An online survey was constructed through Qualtrics, and was created by experts in the field of research. The survey has not yet been published.

4.2. Participants

Participants for the study were reached via email personally, or via a contact person at the appointed hospitals, who then distributed the emails to hospital workers (physicians and nurses), thus convenience sampling was used. The respondents for this study participated voluntarily and received two reminders about filling out the survey. The respondents of this research were hospital workers, either physicians or nurses recruited from hospitals in the Netherlands and Germany, with any age and any amount of years of experience.

4.3. Materials

The following survey was completed by the respondents, in either Dutch or German: *Antimicrobial Resistance & Infection Control*. This survey is about hospital workers' experiences with antibiotic resistance and infection prevention in hospitals (See Appendix A). The survey was pilot-tested with one physician and one nurse, after which small changes were made to wording of statements to ensure clarity. In addition, an extra note was added at the beginning of the survey regarding the daily work of the nurses and their ability to answer the statements based on that work.

The survey consists of two parts, named: 1) 'Your experiences with the antimicrobial resistance problem' and 2) 'Your experiences with hospital processes related to antimicrobial resistance'. In the first part, 12 statements were presented the respondents had to evaluate on a Likert scale from 1 (fully disagree) to 5 (fully agree). The first four statements regard the problem of AMR, the following three statements were about leading causes of AMR, and the last five statements consider the person's beliefs to working with AMR. Examples of said statements are: 'AMR is a problem for our hospital', 'One of the leading causes of AMR is the improper use of antibiotics by patients', and 'I believe that antibiotic prescriptions should be based on lab results'.

Part two of the survey consisted of six different sections (A-F), with 32 statements to be evaluated on a Likert scale from 1 (not important/insufficient) to 5 (very important/sufficient). Following is an explanation of the sections A-F with example statements:

A. Screening Diagnostics, defined as: 'The process of finding out if a patient carries a resistant bacterium (incl. screening, taking cultures and testing cultures)'. This section consisted of four statements; example statement: 'How important do you think screening diagnostics are to limit AMR?'.
B. Infection Diagnosis, defined as: 'The diagnosis of an infection (present/absent)'. This section consisted of four statements; example statement: 'Do you feel like you have sufficient influence on the infection diagnosis to limit AMR?'.
C. Treatment, defined as: 'The choice of antibiotics that meets both the patient's diagnosis and the local antibiotic guidelines'. This section consisted of six statements; example statement: 'Do you have sufficient resources for the treatment to limit AMR?'.
D. Infection Control, defined as: 'The implementation of suitable hygiene measures for infection and transmission prevention (e.g. antisepsis, hand hygiene, use of personal protective equipment, and cleaning of equipment and rooms)'. This section consisted of

six statements; example statement: 'Do you have sufficient knowledge for infection control to limit AMR?'.

E. Logistics, defined as: 'The planning of HRMO patients at treatment centers, OR's, day admission and nursing unites (isolation rooms, single rooms)'. This section consisted of six statements; example statement: 'Do you have sufficient support from colleagues for logistics to limit AMR?'.
F. Outbreak Management, defined as: 'The actions and responsibilities during an outbreak'. This section consisted of six statements; example statement: 'Do you have sufficient support from your supervisor for outbreak management to limit AMR?'.

Following this, an open question was asked at the end. In this study, only the question from the Dutch version: 'Which improvements would you like to implement with regards to safety stewardship for BMRO (incl. MRSA)?' will be regarded.

4.4. Procedure

The study was approved by the Ethics Committee of the Faculty of Behavioural, Management and Social sciences (BMS) of the University of Twente, with IRB approval code: BCE18321. The respondents completed the survey online, in their own space and time. Before the initial survey started, participants were asked to answer questions regarding socio-demographic information, namely: age (<25 years old, 25-35 years old, 36-45 years old, 46-55 years old, 56-65 years old, 65> years old), gender (male/female), the hospital the respondent works in, the department the respondent works in, the respondent's function, the amount of years experience in this function (<1, ≥1 year <5 years, 5-10 years, >10 years), and the amount of years of experience at the hospital the respondent works in (<1, ≥1 year <5 years, 5-10 years, >10 years). Following this, the *Antimicrobial Resistance & Infection Control* survey started (See Appendix A). It was named the survey would take about 15 minutes to complete, and answers would be processed anonymously. All items from the survey were to be evaluated on a Likert scale from 1 to 5. If respondents indicated to be a nurse at the beginning of the survey, it was mentioned that not all statements could be answered based on their primary duties/responsibilities only. Therefore, they were asked to indicate their answers in the best way possible based on their work experience and collaboration with doctors. At the end of the survey, an open question about general improvements regarding antimicrobial resistance & infection control could be answered by typing in a text box.

4.5. Data analyses

The collected data was analysed using the 25th version of SPSS. Before starting analyses, participants not fitting the set criteria for this study (residents, physician assistants/nurse specialists, hygiene specialists and medical assistants) were deleted from the dataset (n=64). The category with function 'Physician Assistants/Nurse Specialists' are thus also excluded from the respondents in order to be able to compare this study to other literature in which only nurses and physicians are included. Following, items that participants did not fill out were excluded using pairwise deletion (Lewis-Beck, Bryman & Futing Liao, 2004). This means that only unanswered items will be excluded from certain analyses when the explicit variables are used, but answered items will still be included. This enables to keep more respondents for analyses. After having determined the final dataset, crosstabs were used to analyse the participants' characteristics.

Exploratory factor analyses (EFA) were conducted to establish scales (Spearman, 1907), which contributed to answering research question one. EFA is used because it can establish the specific items that cluster together to form certain factors, in order to create reliable scales. An EFA was conducted to create a correlation matrix and check assumptions. The Kaiser-Meyer-Olkin (KMO) measure, which should be higher than 0.5 (Kaiser, 1974) and Bartlett's test, which should be significant, were checked for these assumptions. Following, Kaiser's criterion (Eigenvalue > 1) (Kaiser, 1960) and a scree plot were used to establish the amount of factors. Next, factors were extracted using oblique rotation first, to test whether factors are correlated. If this correlation is low (r<0.3), varimax rotation will be used to show which items from the survey belong to which factor. After having established this, reliability analyses were done on all scales, to determine Cronbach's alpha, which should be $\alpha \geq 0.7$ (Nunnally, 1978), to find whether the found scales have high internal consistency, and are thus reliable. After having established the scales, individual scores of nurses and physicians were determined by calculating mean scores. This was done for all scales separately, in order to answer the first research question. Following, analyses were done to find out whether there were statistically significant differences between the mean scores of nurses and physicians for both scales. Depending on the normality distribution of the scales, a two independent samples t-test will be performed in case of normal distribution; a Mann-Whitney U test will be performed in case of non-normal distribution. In the present study, differences are seen as significant when p<0.05.

The answers to the open question were coded using Atlas.ti 8, and used to interpret the results of the survey, in combination with answering research questions number two and three.

The answers were given in Dutch, but translated quotes and explanations in English are used in this study. A combination of deductive and inductive (if necessary) coding methods will be used (Yi, 2018). The deductive approach was based on the topics from the survey: screening diagnostics & infection diagnosis, treatment, infection control, logistics, and outbreak management. If any new or emerging topics were named by the participants, new codes will be created. After having found all codes, sub-codes will be identified by looking at overlapping themes mentioned by nurses and physicians. This way, the differences between nurses and physicians regarding improvements can be seen. The found sub-codes will be supported and explained by quotes from nurses and physicians. The importance of (sub-)codes will be established by looking at the amount of times an improvement is mentioned. The codes initially established were checked again by a co-student and supervisor to reduce bias in coding.

5. Results

5.1. Respondents

A sample of hospital workers from the Netherlands and Germany participated in the online survey (*n*=638). After deleting unfit cases for the sample, 574 responses were used in descriptive analyses to provide an overview of the respondents' characteristics (See Table 1). The respondents are divided into two categories: nurses and physicians. From these groups, nurses are mostly between 25 and 35 years old, female, Dutch, and have over 10 years of experience in their function. Most physicians are also between 25 and 35 years old, male, German, and have over 10 years of experience in their function. So, groups are comparable on the aspect of age and work experience. However, there is a considerate division between both groups concerning gender and nationality.

Table 1

Characteristics participants (*N*=574), *divided into two categories: nurses and physicians*

	Nurses (*n* = 397)	Physicians (*n* = 177)
Category	Percentage (%)	Percentage (%)
Age		
<25 years	8	0
25-35 years	29	37
36-45 years	23	36
46-55 years	26	15

56-65 years	14	10
>65 years	0	1
Gender		
Male	16	67
Female	84	33
Nationality		
Dutch	55	28
German	45	72
Work Experience in their function		
<1 year	2	3
≥ 1 year, < 5 years	16	23
5-10 years	24	32
>10 years	58	41

5.2. Exploratory factor analyses

The results of the exploratory factor analysis (EFA) showed that The Kaiser-Meyer-Olkin (KMO) measure = 0.71, thus sampling adequacy is '*middling*' (Kaiser, 1974). In addition, Bartlett's test showed that the correlations between variables were significant (p<0.001). Following, 12 factors were found using Kaiser's criterion (Eigenvalue>1) (Kaiser, 1960), while a scree plot suggested 7 factors (See Figure 1).

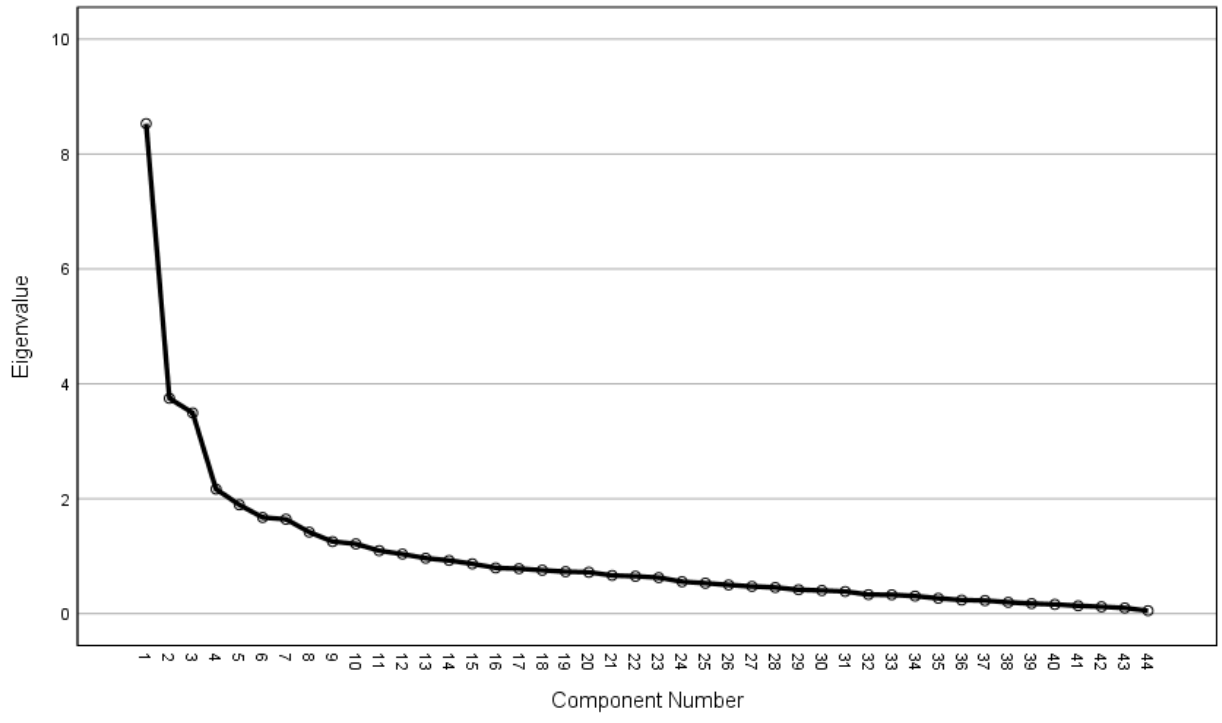

Figure 1. Scree plot showing six factors with an Eigenvalue >1

The scree plot was used for further analyses, since Kaiser's criterion has been found to often overestimate the amount of factors that need to be extracted (Linn, 1968). Thus seven factors were extracted using an oblique rotation, to test whether factors were correlated. Correlations were low (r<0.3), thus varimax rotation was used to cluster items in scales (See Appendix B for Rotated Component Matrix and Found Scales). From this matrix, all scales seemed to have at least one item that loaded medium to high on the component (≥ 0.5), thus for all scales reliability was checked. All scales were found to be reliable, with high internal consistency (See Table 2). However, from scale 3, the item 'I believe that antibiotics are prescribed at the request of patients', was deleted, which increased reliability from 0.78 to 0.84. From the other scales none of the items were deleted, since reliability could only be increased by 0.01 or 0.02 when deleting 1 item. However, since deleting one item from the scale will not cause a significant increase in reliability, no items from other scales were deleted. Table 2 also shows the definitions of the scales, these are based on the items included in the scales (See Appendix B for items on scales).

Table 2

Reliability and definitions with abbreviations of the seven found scales

Factor/scale	**Cronbach's alpha (*α*)**	**Definition & abbreviation scale**
1	0.87	Experiences with antimicrobial stewardship programs (ASP[a])
2	0.85	Experiences with and support from colleagues and supervisors (Support)
3	0.84	Experiences with the degree to which AMR is problematic (Problems)
4	0.73	Experiences with the perceived importance to limit antimicrobial resistance (Importance)
5	0.80	Experiences with logistics

		(Logistics)
6	0.79	Experiences with diagnostics (Diagnostics)
7	0.80	Experiences with outbreak management (OM)

Note. [a]Antibiotic Stewardship Program

5.3 Sub-question 1*: Are there differences between nurses and physicians regarding experiences with ASP and IPC?*

The data was non-normally distributed for all the scales, so Mann-Whitney U tests were used to test whether there were significant differences between nurses and physicians. A significant difference was found between nurses and physicians regarding their experiences with ASP, Problems, Diagnostics, and OM (See Table 3). On ASP, Diagnostics and OM physicians scored higher, thus had a more positive experience with. Nurses scored higher on Problems, which means they think the AMR-issue is more problematic compared to physicians.

Table 3

Means and standard deviations of the scores of nurses and physicians, of the found scales.

	Nurses (n = 397)	Physicians (n = 177)	p
ASP, mean(S.D.[a])	2.78(0.72)	4.12(0.58)	**
Support(S.D.[a])	3.63(0.81)	3.70(0.81)	
Problems, mean(S.D.[a])	4.41(0.77)	4.34(0.70)	*
Importance, mean(S.D.[a])	4.63(0.43)	4.65(0.40)	
Logistics, mean(S.D.[a])	3.51(1.03)	3.65(0.94)	
Diagnostics, mean(S.D.[a])	3.56(0.83)	3.83(0.74)	**
OM, mean(S.D.[a])	3.42(1.07)	3.67(0.99)	*

Note. [a]Standard Deviation. *p<0.05, **p<0.001

5.4 Sub-question 2: *What suggested improvements have nurses and physicians specified to the stewardship programs?*

Several recurring desired improvements, or codes were found while analysing the answers to the open-ended question. Some improvements that were mentioned overlap in terms of what is being said, thus have been coded twice or more. The codes mentioned in the tables below are ordered from most-occurring to least occurring. The code mentioned most was 'Screening Diagnostics & Infection Diagnosis', namely 66 times in total, 9 times by physicians, and 57 times by nurses. Screening diagnostics and infection diagnosis have been put together as one code, since the proposed improvements mentioned sometimes overlap in definition or explanation. From the answers given, this code can be defined as: 'desired improvements regarding the screening and diagnosing of infections'. Five different sub-codes were found for this code, named: Fast diagnostics, diagnosis, cultivation, and results testing, Timely knowledge about patients, Need for primary care diagnostics and cultivation, and Better diagnostics and diagnosis (See Table 4). Quotes by nurses and physicians have been used to clarify and present the variation of the found sub-codes.

Table 4

Screening Diagnostics & Infection Diagnosis sub-codes and example quotes from nurses and physicians

Sub-codes	**Nurses**	***n***	**Physicians**	***n***
Fast diagnostics, diagnosis, cultivation, and results testing	*'Faster diagnostics'.* *'Even faster results from cultures that have been used'.*	48	*'Easier and quicker diagnostics to see whether there is a problem or not'.* *'Faster cultivation introduction'.* *'Faster availability test also during the weekend'.*	8
Timely knowledge about patients	*'Timely/before admission clarity infected patients*	3	*'Before admission clarity about*	1

	… upon admission clarity history'.		*infected patients'.*	
Need for primary care diagnostics and cultivation	'*Diagnostics from 1st line (primary care), is being missed sometimes*'. '*Outpatient cultivation*'.	4		-
Better diagnostics and diagnosis	'*That there is better testing and it is checked whether someone has BRMO or MRSA*'.	3		-

'Infection Control' was an important point of improvement as well, named 48 times in total, 42 times by nurses and 6 times by physicians. This code can be defined as: 'desired improvements regarding work surrounding infection control and infection control policies'. For this code, several sub-codes were found, namely: Clarity and simplicity in infection control policies and isolation protocols, More time for and better hygienic work, Increase understanding and knowledge about infection control for everyone, Transparency and clarity within and between organisations and externals regarding infection control policies, and Conformity to the rules of infection control (See Table 5). Quotes by nurses and physicians have been used to clarify and present the variation of the suggested improvements mentioned.

Table 5

Infection Control sub-codes and example quotes from nurses and physicians

Sub-codes	**Nurses**	***n***	**Physicians**	***n***
Clarity and simplicity in infection control policies and isolation protocols	*'clearer policy when it comes to isolation measures. Sometimes still unclear'.* *'more insightful, unambiguous policy'.*	18	*'clarity protocols'.* *'Clarity about prevention policy, is too broad for hospital workers'.*	6
More time for and better hygienic work	*'…Better cleaning of the ward...'.*	7		-

	'There is just no time to work 100% hygienic'.		
Increase understanding and knowledge about control for everyone	*'More knowledge for nurses'.* *'Patient awareness'.* *'Possibly an annual training'.*	9	-
Transparency and clarity within and between organisations and externals regarding infection control policies	*'Hospitals are not in line with regard to prevention policy'.* *'Clarity in the working method with regard to infection prevention in the home situation, care institutions, hospital / nursing home and hospital, etc. There are still too many differences between them'.*	5	-
Conformity to the rules of infection control	'*Everyone must comply to the prevention rules!!'*	3	-

Improvements for 'Logistics' were named 41 times in total, 7 times by physicians, and 34 times by nurses. This code can be defined as: 'desired improvements regarding planning, management and communication in hospital settings'. The sub-codes found are: Reservation system of rooms, Transparency and communication between everyone involved, and More hospital workers so less time pressure (See Table 6). Quotes by nurses and physicians have been used to clarify and present the variation of the found sub-codes.

Table 6

Logistics sub-codes and example quotes from nurses and physicians

Sub-codes	**Nurses**	***n***	**Physicians**	***n***

Reservation system of rooms	'*Create multiple options with regard to single rooms. Now sometimes short'.* *'More locked rooms'.* *'An isolation room for MRSA patient'.*	29	*'More rooms upon admission'.*	2
Transparency and communication between everyone involved	*'Better communication with infection prevention. Now it's via email...'.* *'Good and clear communication between all relevant parties. Patient - Family - Physician - Nurse - Infection prevention collaborator - possibly other parties concerned'*	6	*'Provide results of hospitals and GPs mutually'.* *Clearer presence (....) of microbiologists and hygiene-specialists'.*	4
More hospital workers so less time pressure	*'More time for hand hygiene (due to work pressure you fly from one patient to another patient, only sometimes hand hygiene is done)'.*	2	*'Expanding and facilitating the AB stewardship team within the hospital!!!'*	2

The code 'Treatment' was named 13 times in total. Three times, improvements were named by physicians, and ten times by nurses. This code can be defined as: 'desired improvements regarding prescription and choice of treatment'. Several different sub-codes were found, namely: Less quickly and/or broadly prescription of antibiotics, Involvement of others in prescribing treatment, Right choice antibiotics, and Faster provision of treatment (See Table 7). Quotes by nurses and physicians have been used to clarify and present the variation of the found sub-codes.

Table 7

Treatment sub-codes and example quotes from nurses and physicians

Sub-codes	**Nurses**	***n***	**Physicians**	***n***
Less quickly and/or broadly prescription of antibiotics	'*Don't start too quick with broad antibiotics'.*	7	'*I am concerned rather with the abundant use of*	1

	'There is still too much and too fast AB prescribed without a clear cause'.		*antibiotics and often broad-spectrum antibiotics where this is not diagnosed'.*	
Involvement of others in prescribing treatment	*'This is not for the hospital, but I think GPs prescribe antibiotics fairly quickly.'*	2	'*that the medical specialist is (almost) always assisted with prescribing antibiotics*'.	1
Right choice antibiotics		-	*'Right choice of antibiotics'.*	1
Faster provision of treatment	'*quicker diagnostics and treatment'.*	1		-

The use of the inductive approach added the code 'Extern' to the already established codes. This code is defined as: 'Other relevant external people/groups/organisations mentioned that can be related to ASPs and the improvement thereof'. In addition, the code 'Other' was found, which mentions remaining important topics named by nurses and physicians. 'Extern' was a topic named rather often, namely 22 times: 7 times by physicians, and 15 times by nurses. Some of the codes are also related to one of the former named codes. For this code, only several quotes will be named to understand the extremes of the code (See Table 8). This means no sub-codes are mentioned, as in the former tables, since for this code, there are many different kinds of externals outside of the hospital setting named such as: farming, external helplines, and boards.

Table 8

Extern quotes from nurses and physicians

Nurses	**Physicians**
'A kind of helpline that you can contact 24 hours a day if you have any questions'.	*'Ban on antibiotics in livestock farming'.*
'It seems important to be cautious about prescribing drugs. (also in animal husbandry!)'.	*'Support in FTE and financially from the Executive Board…'.*

Lastly, the 'Other' codes will be mentioned (See Table 9). This is done similarly as Table 10, thus some quotes will be given to point out the extremes in the code. This code was named 15 times in total: twice by physicians, and 13 times by nurses. Since the open question asked for improvements from nurses and physicians, this code also involves the mention of positive comments to show that some respondents find that ASPs are sufficient already.

Table 9

Other quotes from nurses and physicians

Nurses	**Physicians**
'insufficient knowledge about this and little occurrence in current work area'.	*'no direct opinion. Should be discussed in consultation'.*
'No points of improvement'.	*'It's going pretty well for BRMO because it's centrally regulated'.*
'No direct changes necessary'.	
'I personally do not, as a nurse I can comply with infection prevention measures and carry out medication assignments'.	

Only one improvement for 'Outbreak Management' was mentioned by a nurse who posed the question: '*What to do in the case of a geriatric confused patient with a customised outbreak management with precisely this group of patients?*'. Thus, it seems regarding this topic, there is still some enhancement necessary regarding protocols in outbreak circumstances.

Concluding, the most relevant improvement propositions to the stewardship programs according to nurses and physicians considers a better reservation system for rooms, faster and better diagnostics and diagnosis and cultivation, in addition to better, clearer and easier infection control protocols to follow, as well as increased knowledge for everyone involved seem important. Lastly, communication between many different groups of people (e.g. GPs, between hospitals, infection prevention specialists, microbiologists, patients, families) is significant as well in order to restrict AMR as best as possible, according to the nurses and physicians.

5.5 Sub-question 3: *What differences can be explored in these suggested improvements between nurses and physicians?*

In order to answer sub-question three, the differences between nurses and physicians regarding the open question will be considered. Looking at the tables 4-9 it seems there are some sub-codes nurses have mentioned, but physicians have not and vice versa. Also, physicians, in comparison to nurses have less mention of improvements when summing the amount of codes. However, when looking at the physician:nurse respondents ratio (397:177), the mention of codes are rather similarly divided.

Looking at the specific codes, it seems physicians, but also nurses find most improvements are necessary in the 'Screening Diagnostics & Infection Diagnosis', 'Infection Control', and 'Logistics' section. Considering 'Screening Diagnostics & Infection Diagnosis', the difference found is that nurses mention the need for better diagnostics and diagnosis, in addition to diagnostics being necessary in primary care, while physicians do not mention this at all (See Table 4). In addition, both mention the importance of faster diagnostics, diagnosis and cultivation to a similar extent. Looking at 'Infection Control', physicians only suggest improvements regarding the clarity of the infection control policies (See Table 5). While nurses mention many more improvements that could be made: better cleaning and more time to work hygienic, increased knowledge and understanding about infection control, transparency between and within organisations and conformity to infection control rules. All these topics seem to be very significant for nurses to be enhanced, but not for physicians at all. Some interesting differences can also be seen looking at 'Logistics'. Nurses mention the need for available (single/isolated) rooms a lot, while physicians, in relation to nurses, are much more focused on transparency and communication between everyone (See Table 6). In addition, both nurses and physicians mention the importance of having more hospital workers, which allows them to have more time to work accordingly. Looking at 'Treatment'-related codes, resemblances can be found regarding prescriptions of those, both nurses and physicians want this to improve (See Table 7). Nonetheless, nurses mention once that quicker treatment is necessary, while physicians once mention that the correct choice of antibiotics is critical. Focusing on the additionally found code 'Extern', physicians mention people within hospitals more often (microbiologists, hygiene-specialists), while nurses focus mostly on the general public, families of patients, and farming (See Table 8). Looking at the newly found code 'Other', apparent is that physicians only mention once they have no direct opinion about

improvements, whereas nurses mention more often that they have no knowledge, or they have no points of improvement at all (See Table 9).

Thus, it seems the overall leading point of improvement for both nurses and physicians are the policies regarding infection control with quicker and improved diagnostics and diagnosis. But there are also differences in the kind of improvements nurses and physicians wish to see, especially on a logistic and infection control level. Nurses' focus is especially on the availability of single and isolated rooms, while physicians would like more transparency in communication and knowledge on patients during work. In addition, nurses have many more practical infection control improvements suggested, while physicians only focus on the advancement of policies.

6. Discussion

The purpose of this study was to find out whether there are differences in experiences with Antibiotic Stewardship Programs (ASPs) and Infection Prevention Control (IPC) between nurses and physicians considering Antimicrobial Resistance (AMR). The results from this study show that there are differences between nurses and physicians regarding their experiences with ASPs, AMR problems, diagnostics, and outbreak management. On ASP, diagnostics and outbreak management, physicians scored higher, thus had a more positive experience with, whereas nurses scored higher on AMR problems, meaning they think AMR is more problematic in comparison to physicians. Additionally, differences, but also similarities can be seen between nurses and physicians regarding their points of improvements for stewardship programs. In general, both are issued with time-restrictions, and the improvement of infection control policies, with physicians more focused on better communication, while nurses focused on hygiene, and the need for more isolated rooms.

It seems the advancement of the infection control policies is regarded as important to both nurses and physicians in this study. This means that in their experience, there is still unclarity or even no proper guideline available to follow. From the other side, it can be argued that guidelines are clear, but not adhered to in a proper manner. In a study done by Cabana et al. (1999), it appears physicians have difficulties adhering to guidelines due to certain limitations. These limitations can include: lack of awareness, lack of familiarity, lack of agreement and lack of self-efficacy. In addition to that, even though healthcare workers are crucial in following IPC, but also ASP guidelines, there are also other aspects that can influence compliance to IPC and ASP guidelines. This could be explained by using the Systems Engineering Initiative for Patient Safety (SEIPS)

model, which is important in illustrating how healthcare workers are affected in organisations (van der Kurk, 2009). This model describes that people are influenced in many ways when adhering to guidelines: by the organisation, the integral approach used, technologies, the environment and set tasks. Additionally, within organisations, every group of healthcare workers has their own beliefs as to how to comply to guidelines (De Bono et al., 2014). This means that some groups may follow rules in a different manner than others, which can clarify the differences between nurses and physicians in terms of what they find important that needs to be improved in terms of ASPs.

Not only differences regarding ASP improvements, but also experiences with ASPs, and the degree to which AMR is perceived to be problematic between nurses and physicians is different. In this, nurses have a more negative experience with ASPs, but also believe AMR to be more problematic than physicians do. An explanation for this can be that nurses and physicians have different tasks, especially concerning treatment. Olans et al. (2016) found that physicians are the ones that prescribe the antibiotics, thus choose the actual drugs the patient will take. Even though nurses do all tasks around the prescribing, such as ordering, administering, and monitoring the drugs to the patient, they seem to be uninvolved in the development of ASPs (Olans et al., 2016). This means that nurses can experience not having much influence on the prescription of treatments and on ASPs. Also, nurses are the people that are most in direct contact with patients, who they monitor all day (Olans et al., 2016). This means they can have a more direct perception of AMR-related problems and how this influences for example their patients and their hospital.

In addition, differences were found between nurses and physicians regarding their experiences with diagnostics. A reason for this can be that nurses are not the people that diagnose patients on having or not having an infection, since they only collect patient-samples (Olans et al., 2016). This can induce them to feel as if they have insufficient or less influence on the diagnostics part, and on the diagnosis of the patient. Following, nurses also stay in contact with the microbiologists who diagnose the infection and the physicians who prescribe the drugs, thus nurses are at the centre of communication. It can be said that nurses have a great amount of tasks surrounding the treatment and diagnosis of patients, for which they might not have all knowledge that is actually needed. Nurses had a more negative experience with outbreak management than physicians do. Cimolai (2008) did a study on the part that healthcare workers play in the spread of *Staphylococcus aureus*, and found that nurses are more often carriers of the disease, thus more easily spread it than physicians do. The reason for this is that nurses have more direct contact with

patients. This might also be the reason why they have more negative experiences with outbreak management compared to physicians.

No differences were found between nurses and physicians regarding the support they perceive on getting from colleagues and supervisors. However, considering other literature it seems nurses think physicians do not show enough sympathy towards nurses, while physicians think they do Casanova et al. (2007), which is a contrasting finding to this study. This experience from nurses could be explained by the idea of an existing hierarchy between nurses and physicians, in which nurses can be perceived as 'lower' in this hierarchy. In addition to that, it seems conflicts between nurses and physicians are rather ignored than communicated and talked through, which can lead to more annoyances with each other over time. These conflicts have been found to have a negative impact on the degree to which IPC protocols are being followed, since adequate leadership leads to better compliance in terms of glove-use and handwashing guidelines (Sinkowitz-Cochran et al., 2012). This is an interesting finding, since from the perspective of the nurses, they have mentioned the need for clearer hygiene protocols, but not the need for better guidance in answering the open question. Thus, it can be said nurses unconsciously seek better leadership, which induces them to follow guidelines to a greater extent, instead of wanting better and clearer IPC protocols.

Limitations of this research can be that participants have not been completely honest or transparent in answering the open question. A reason for this might be unease towards reporting improvements about their work-setting, or fear of publication of answers. This could have influenced the results in such a way that less suggestions of improvements have been given, or even some significant improvements not having been mentioned at all. This could have been enhanced by mentioning once again all answers will be treated anonymously, and it would greatly help research on how to limit AMR, when being completely honest. Additionally, even though the survey asked about many aspects regarding AMR, the open question can cause ambiguities in interpretation, by both participants and researchers. The coding-scheme could have been influenced this way, by misinterpretation of answers by researchers. This could have been improved by conducting one-on-one interviews, or focus groups, to see how nurses and physicians formulate AMR-related issues and ASP improvements themselves. The sample used in this study is considered a strength: The nurse:physician ratio is 397:177. When looking at the nurse:physician ratio in a hospital setting, it has been found that there are three times as many nurses than physicians in hospitals in the Netherlands (Centraal Bureau voor de Statistiek [CBS], 2017). In

addition, only one in seven nurses in the Netherlands is male, being very comparable to the division of male:female nurses in this research. Also, in this study, only the Dutch answers to the open question have been examined, but the German ones were left out. In addition, the two groups of nurses and physicians were rather equal concerning age and years of work experience. Hence, all former points mentioned mean that this study can be generalised to hospitals in the Netherlands. Looking at other strengths of this study: all found scales have a high Cronbach's alpha, meaning the scales have high internal consistency, and are thus reliable to use. In addition to that, even though misinterpretation of the answers could have happened, interesting improvements have been suggested by nurses and physicians, which show the diversity of what they feel is needed to limit AMR as best as possible.

This study has been certainly relevant in pointing out that there are differences between nurses and physicians regarding ASPs. Since nurses are under-recognised in the development of ASPs (Edwards et al., 2010; Olans et al., 2016; Wentzel et al., 2014), this study has made a start in revealing the perceptions nurses have on ASPs and the improvements they think are necessary to be made. Thus, future research should focus on including nurses in the development process of ASPs by involving them in the multidisciplinary team that focuses on decision-making processes regarding policies. This means that ultimately, ASPs can be greatly improved since nurses are leading people in working with and the carrying out of those (Edwards et al., 2010; Olans et al., 2016).

It also seems that nurses and physicians experience that they work under time pressure, while simultaneously needing diagnostics, diagnosis and testing to be faster. The time pressure issue can be due to the fact that there are staff shortages in hospital settings: in 2018 in the Netherlands, there were 2200 open vacancies for physicians, nurses and other medical staff (van den Brink, Herderschee & Vleugels, 2018). It has been found that eHealth could help nurses on an educational level concerning antimicrobial stewardship (Wentzel et al., 2014). Thus, something that could be researched in the future is whether eHealth technologies could also help minimise the degree to which the staff shortages affect nurses and physicians in their work. Meaning, could eHealth technologies make the daily work of health care workers easier and/or faster by providing quicker ways of working or taking over certain tasks?

It appeared nurses and physicians are in need for clear, simple and straightforward IPC policies and guidelines. Currently in the Netherlands, there is no unambiguous policy available to them, since the Dutch organisation (WIP) for infection control had to quit due to lack of financial

support from the government (RIVM, 2018b). The inadequate amount of support from the goverment means there is a lack of awareness of the gratitude of the AMR issue at the government, in addition to this lack of awareness being seen in clinicians themselves (Abera et al., 20140; Giblin et al., 2004). Thus, as also suggested by nurses and physicians, more knowledge and information regarding infection prevention should be provided, not only for the general public, and the government, but also for hospital workers themselves. All in all, looking at practicalities, this means a new national committee should be introduced who establishes new and clear IPC policies that are similarly applicable to all hospitals in the Netherlands, which should also strengthen the degree to which guidelines are being applied similarly in hospital settings across the country.

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8. Appendices

Appendix A: Antimicrobial Resistance & Infection Control Survey (English version)

Sociodemographic information

Q1. What is your age? (<25 years, 25-35 years, 36-45 years, 46-55 years, 56-65 years, >65 years)

Q2. What is your gender? (Female, Male)

Q3. In which hospital do you work? ("Hospital", etc.)

Q4. At which department do you work? ("Anaesthesiology", etc.)

Q5. What is your function? (Medical specialist, Nurse).

Q6. How many years of experience do you have in this function? (<1 year, ≥1 year <5 years, 5-10years, >10 years)

Q7. How many years of experience do you have at this hospital? (<1 year, ≥1 year <5 years, 5-10years, >10 years)

Part 1: Your experiences with the antimicrobial resistance problem

Please indicate on a scale of 1 (Fully disagree) to 5 (Fully agree) to what extent you agree with these statements.

Q1a. AMR is a problem for public health.

Q1b. AMR is a problem for nursing homes.

Q1c. AMR is a problem for our hospital.

Q1d. AMR is a problem for my patients.

Q2a. One of the leading causes of AMR is the improper use of antibiotics in farming animals.

Q2b. One of the leading causes of AMR is the improper use of antibiotics by patients.

Q2c. One of the leading causes of AMR is the transfer of nursing home patients to the hospital.

Q3. I believe that antibiotics are prescribed at the request of patients.

Q4. I believe that antibiotic prescriptions should be based on lab results.

Q5. I am sufficiently informed about the diagnostic policy.

Q5. I believe that broad spectrum antibiotics should be provided when there is doubt of an infection.

Q6. I believe that I can contribute sufficiently to limit AMR.

Part 2: Your experiences with hospital processes related to antimicrobial resistance

Part 2A: Screening diagnostics

The process of finding out if a patient carries a resistant bacteria (incl. screening, taking cultures and testing cultures).

Q2A.1. How important do you think screening diagnostics are to limit AMR? (1: Not important-5:Very important)

Q2A.2. Do you feel like you have sufficient influence on screening diagnostics to limit AMR? (1: Insufficient-5:Sufficient)

Q2A.3. Do you have sufficient resources for screening diagnostics to limit AMR? (1: Insufficient-5:Sufficient)

Q2A.4. Do you have sufficient knowledge for screening diagnostics to limit AMR? (1: Insufficient-5:Sufficient)

Part 2B: Infection diagnosis

The diagnosis of an infection (present/absent).

Q2B.1. How important do you think the infection diagnosis is to limit AMR? (1: Not important-5:Very important)

Q2B.2. Do you feel like you have sufficient influence on the infection diagnosis to limit AMR? (1: Insufficient-5:Sufficient)

Q2B.3. Do you have sufficient resources for the infection diagnosis to limit AMR? (1: Insufficient-5:Sufficient)

Q2B.4. Do you have sufficient knowledge for the infection diagnosis to limit AMR? (1: Insufficient-5:Sufficient)

Part 2C: Treatment

The choice of antibiotics that meets both the patient's diagnosis and the local antibiotic guidelines.

Q2C.1. How important do you think the treatment is to limit AMR? (1: Not important-5:Very important)
Q2C.2. Do you feel like you have sufficient influence on the treatment to limit AMR? (1: Insufficient-5:Sufficient)
Q2C.3. Do you have sufficient resources for the treatment to limit AMR? (1: Insufficient-5:Sufficient)
Q2C.4. Do you have sufficient knowledge for the treatment to limit AMR? (1: Insufficient-5:Sufficient)
Q2C.5. Do you have sufficient support from colleagues for the treatment to limit AMR? (1: Insufficient-5:Sufficient)
Q2C.6. Do you have sufficient support from your supervisor for the treatment to limit AMR? (1: Insufficient-5:Sufficient)

Part 2D: Infection control
The implementation of suitable hygiene measures for infection and transmission prevention (e.g. antisepsis, hand hygiene, use of personal protective equipment, and cleaning of equipment and rooms).
Q2D.1. How important do you think infection control is to limit AMR? (1: Not important-5:Very important)
Q2D.2. Do you feel like you have sufficient influence on infection control to limit AMR? (1: Insufficient-5:Sufficient)
Q2D.3. Do you have sufficient resources for infection control to limit AMR? (1: Insufficient-5:Sufficient)
Q2D.4. Do you have sufficient knowledge for infection control to limit AMR? (1: Insufficient-5:Sufficient)
Q2D.5. Do you have sufficient support from colleagues for infection control to limit AMR? (1: Insufficient-5:Sufficient)
Q2D.6. Do you have sufficient support from your supervisor for infection control to limit AMR? (1: Insufficient-5:Sufficient)

Part 2E: Logistics

The planning of HRMO patients at treatment centers, OR's, day admission and nursing unites (isolation rooms, single rooms).

Q2D.1. How important do you think infection control is to limit AMR? (1: Not important-5:Very important)

Q2D.2. Do you feel like you have sufficient influence on logistics to limit AMR? (1: Insufficient-5:Sufficient)

Q2D.3. Do you have sufficient resources for logistics to limit AMR? (1: Insufficient-5:Sufficient)

Q2D.4. Do you have sufficient knowledge for logistics to limit AMR? (1: Insufficient-5:Sufficient)

Q2D.5. Do you have sufficient support from colleagues for logistics to limit AMR? (1: Insufficient-5:Sufficient)

Q2D.6. Do you have sufficient support from your supervisor for logistics to limit AMR? (1: Insufficient-5:Sufficient)

Part 2F: Outbreak management

The actions and responsibilities during an outbreak.

Q2D.1. How important do you think outbreak management is to limit AMR? (1: Not important-5:Very important)

Q2D.2. Do you feel like you have sufficient influence on outbreak management to limit AMR? (1: Insufficient-5:Sufficient)

Q2D.3. Do you have sufficient resources for outbreak management to limit AMR? (1: Insufficient-5:Sufficient)

Q2D.4. Do you have sufficient knowledge for outbreak management to limit AMR? (1: Insufficient-5:Sufficient)

Q2D.5. Do you have sufficient support from colleagues for outbreak management to limit AMR? (1: Insufficient-5:Sufficient)

Q2D.6. Do you have sufficient support from your supervisor for outbreak management to limit AMR? (1: Insufficient-5:Sufficient)

Appendix B: Rotated Component Matrix with found scales

	Scales						
Item from survey	ASP*	Support	Problems	Importance	Logistics	Diagnostics	Outbreak Management
1_1aProblem_NursingHomes			0.836				
1_1bProblem_Ourhospital			0.785				
1_1cProblem_MyPatients			0.760				
1_1dProblem_Me			0.712				
1_2aCause_UseFarmingAnimals							
1_2aCause_TransferNursingHomes							
1_2aCause_ByPatients			0.434				
1_3aBelief_AntibioticsAtRequestPatients							
1_3aBelief_AntibioticsBasedOnLabResults				0.548			
1_3aBelief_InformedDiagnosticPolicy						0.711	
1_3aBelief_DoubtInfectionStartBroadSpectrum							
1_3aBelief_SufficientContribution	0.518						
2_1.1Diagnostics_Importance				0.603			
2_1.2Diagnostics_Influence						0.501	
2_1.3Diagnostics_Resources						0.701	
2_1.4Diagnostics_Knowledge						0.784	
2_2.1Diagnosis_Importance				0.468			
2_2.2Diagnosis_Influence	0.618						
2_2.3Diagnosis_Resources	0.723						
2_2.4Diagnosis_Knowlege	0.618						
2_3.1Treatment_Importance				0.688			
2_3.2Treatment_Influence	0.803						
2_3.3Treatment_Resources	0.685						
2_3.4Treatment_Knowledge	0.744						
2_3.5aTreatment_Colleagues	0.664						
2_3.5bTreatment_Supervisor	0.587	0.535					
2_4.1InfectionPrevention_Importance		0.412		0.680			
2_4.2InfectionPrevention_Influence							
2_4.3InfectionPrevention_Resources							
2_4.4InfectionPrevention_Knowledge							
2_4.5aInfectionPrevention_Colleagues		0.662					
2_4.5bInfectionPrevention_Supervisor		0.811					
2_5.1Logistics_Importance							
2_5.2Logistics_Influence					0.773		
2_5.3Logistics_Resources					0.758		
2_5.4Logistics_Knowledge					0.620		
2_5.5aLogistics_Colleagues		0.527			0.513		
2_5.5bLogistics_Supervisor		0.683					
2_6.1OutbreakManagement_Importance				0.583			
2_6.2OutbreakManagement_Influence							0.670
2_6.3OutbreakManagement_Resources							0.634
2_6.4OutbreakManagement_Knowledge							0.697
2_6.5aOutbreakManagement_Colleagues		0.665					0.411
2_6.5bOutbreakManagement_Supervisor		0.778					

Note. *Antibiotic Stewardship Programs