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IT'S OUT OF MY HANDS

Perceptions about antibiotic resistance in rural India

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Sammanfattning

Bakgrund: Indien är ett av de länder som drabbas hårdast av antibiotikaresistens (ABR). Eftersom större delar av befolkningen är utan rent dricksvatten och i brist på sanitet är infektioner mycket vanliga. Det är lätt att få tag på antibiotika. Det är billigt och vanligtvis behövs inget recept för att köpa dem. Att förebygga infektion och minska möjligheterna för mikroorganismer att spridas mellan patienter och personal är centralt i omvårdnad. De resistenta bakterierna begränsas inte av länder och gränser, och det enda sättet att besegra det i denna globaliserade värld är att samarbeta internationellt.
Syfte: Att utforska uppfattningar om antibiotika och antibiotikaresistens bland sjuksköterskor, sjuksköterskestudenter och farmaceuter på landsbygden i Indien.
Metod: En kvalitativ studie där intervjuer gjordes med totalt 11 deltagare; 5 sjuksköterskor, 5 studenter och 1 farmaceut. Data analyserades med hjälp av kvalitativ innehållsanalys.
Resultat: Huvudfyndet i denna studie var känslan av att ABR låg bortom deltagarnas kontroll. Avsaknad av auktoritet för att kunna göra skillnad gjorde att deltagarna inte engagerade sig i ämnen som de ansåg vara utanför deras områden, såsom ABR. Vidare identifierades tre teman ur dataanalysen: brist på kunskap, påverkan av sjuksköterskans roll och det tredje temat, utmaningar i samhället. Även subteman där deltagarnas antaganden om ABR analyseras.
Slutsats: Eftersom sjuksköterskans roll var mycket begränsad visade deltagarna lite intresse för de frågor som de inte kunde påverka, inklusive frågor om ABR.

Nyckelord: *Antibiotikaresistens, Bakteriell, Antibiotika, Omvårdnad, Indien*

Abstract

Background: India is one of the countries most affected by antibiotic resistance (ABR). Since larger parts of the population are without safe drinking water and lack of sensible sanitation; infections are very common. The antibiotics are easily accessible, they are cheap and usually available without prescription. Preventing infection and reducing opportunities for microorganisms to pass between patients and staff is central to nursing care. Bacteria are not limited by countries and borders, and the only way to defeat them, in this globalized world, is to work together internationally.

Aim: To explore perceptions about antibiotics and antibiotic resistance among nurses, nursing students and pharmacists in rural India.

Method: A qualitative study with interviews was conducted with 11 participants in total; 5 nurses, 5 students and 1 pharmacist. Data was analyzed using qualitative content analysis.

Result: The main finding of this study was the feeling of ABR being out of the participant's hands. Lacking of authority to make an impact left the participants doing only what was in their area of responsibility and not engage in subjects they considered were out of their field, such as ABR. Furthermore the data analysis revealed three themes: lack of knowledge, impact of the nurse's role and thirdly challenges of the society. In addition there are subthemes analyzing the participant's perceptions about ABR.

Conclusion: As the nurse's role was very limited, participants showed little interest regarding areas that they could not influence. ABR was considered a subject out of their area of influence.

Key words: *Drug Resistance, Bacterial, Antibiotic, Nursing, India*

Content

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Dictionary

ABR - Antibiotic resistance
AB - Antibiotics
Caste system - A Hindu system based on heritage caste. Four main caste describing the intellectuals, the warriors, the tradesmen, the labor and the outcast, maintains the

foundation of a complex system with 2500 castes and even more sub castes. The caste decides a person's duties, right and social life (Nationalencyklopedin, 2017).
Community posting - In the third semester for one month and in the seventh semester for five week the nursing students of Manikaka Topawala University goes to Governmental Hospital for practice and they will also do home visit in the rural areas. They make basics screening of the public and when needed they direct people to the care center.
7th semester nursing students - in India the BSc nursing programme is 4 years, 8 semesters in total.

Background

India — the Country

India, with over a trillion inhabitants is often called the world's largest democracy. The country is ruled by a democratic government where both women and people of lower caste are included in the government sector. The country is characterized by major class inequalities among the population where a large proportion lives in poverty (Globalis, 2017). About 450 million people live in such poverty that their lifestyle is comparable with the inhabitants of the poorest countries in the world that use only 1,25 dollars per day to make a living (SIDA, 2017). General compulsory schooling attendance is between the ages 6-14 years, and since 2010, all children legally have the right to free education, regardless of social background or gender. In rural areas, it is common for the children to help and financially support the family even though child labor is illegal. Government schools are free of charge but the standard of teaching and facilities are usually low. Private schools maintain a higher standard, but can be very expensive. In 2011, three-quarters of the population could read which corresponded to 85% of all the men and 65% of women in the country. India is a leading nation in technology and IT (Landguiden, 2017). The health system in India is divided in private and public health providers. In the rural area there are mainly private hospitals. As an attempt to provide healthcare to all of the population, sub-centers, primary health centers and community health centers are implicated in certain areas that are difficult to reach. The sub-center is the first contact point between the primary health-care system and the community (Choksi, Patil, Khanna, Neogi, Sharma, Paul & Zodpey 2016). There are large differences in quality between the public and private healthcare. A large amount of people do not have access to neither schools nor hospitals due to lack of access in segregated areas. One of the largest health problems that increase every day is the antibiotic resistance (ABR) in India. The reasons for increased ABR is due to the fact that antibiotics (AB) are available for purchase in the drugstore without physicians prescription, and the pharmaceutical industry releases waste to the water, which

many people use in the household (SIDA, 2017). It is estimated that 70-80% of the AB that is prescribed by healthcare professional in the country is unnecessary (Central Drug Standard Control Organization, 2014). This might lead to inadequate, indirect and unknowing use of AB. Other reasons for resistance development are lack of hygiene, limited access to healthcare and overpopulation (Melhus, 2016).

Antibiotic

AB are effective medicines that prevent and treat bacterial infections. Before antibiotics were first used 50% of all deaths were caused by infections, today the number is around 20% (Ramel, 2011). AB are necessary to carry out major surgery, cancer chemotherapy, organ transplants and the care of premature babies. Without effective AB these treatments would not be possible and the result would be noticeably worse (Lee, Cho, Joeng & Lee 2013). World Health Organization (WHO, 2016) guides that, before insertion of antibacterial medicines it should always first be ensured if a bacterial infection is present. It is important that the treatment is completed throughout the scheduled time and not interrupted too early. This is crucial to avoid the development of resistance.

Antibiotic Resistance

ABR occurs when bacteria change in response to the use of AB. Bacteria are constantly changing. There are various reasons why a bacterium suddenly becomes insensitive to an AB. Mutation, transfusion and conjugation are different approaches for bacteria to develop resistance. Mutations occur constantly and randomly. A mutating bacteria change its genes or heredity. All mutations do not lead to resistance, however some do. If such mutation occurs during an AB treatment, the mutant bacterium may beat out all the other non-resistant bacteria. Transfusion is an effective way for bacteria to develop resistance. The bacteria pick up DNA containing a resistance gene from the environment which is put in the chromosome. Conjugation describes another fast procedure for the bacteria to develop. Bacteria use this technique to transfer genetic material from one bacterium to another (Nathan & Cars, 2014).

The bacteria are classified as susceptible, intermediate, or resistant (SIR). Susceptible refers to an infection that is sensitive to certain antibiotics. Intermediate shows an uncertain therapeutic effect on antibiotics. The bacteria have either developed resistance or a lower sensitivity towards the antibiotics naturally. Resistant describes the clinical effect of the treatment as unlikely with antibiotics. Therefore, the bacteria have developed significant resistance mechanisms or it naturally has resistance towards antibiotics. The SIR-criterias highlight different levels of resistance to optimize the individual treatment for each patient (Rodloff,

Bauer, Ewig, Kujath & Müller, 2008).

Some of the most common resistant bacteria are Methicillin-resistant Staphylococcus aureus, MRSA, extended spectrum beta-lactamase, ESBL and Vancomycin-resistant Enterococcus, VRE. All these bacterias usually are included in human normal flora, but for different reasons and on different pathways, they have developed resistance against various types of antibiotics (Folkhälsomyndigheten, 2014).

Antibiotic resistance in the world

Since many countries do not monitor the antibiotic-resistant bacteria, it is unclear how big the spread is. However, there are alarming statistics that demonstrate the problems. In South East Asia it is estimated that one child dies every second due to failed attempts to treat resistant bacteria. Even in the United States of America (US) and in the European Union (EU) the numbers of people dying as a result of multi-resistant bacteria are devastating. The most vulnerable are the youngest, the oldest and people with compromised immune systems, although no one is really safe (Nathan et al. 2014). In Sweden 14% of the inhabitants have E-coli bacteria that are resistant toward Fluoroquinolones antibiotics, e.g. Ciprofloxacin. In India the corresponding number is 84% (Resistance Map, 2017).

Sweden has smaller problems compared to global misuse of antibiotics because the drug prescriptions are controlled by authorities. Besides, all healthcare professionals in Sweden are made aware of the different ways resistant microorganisms can spread. In spite of the rigorous efforts from Swedish authorities and healthcare system the resistant microorganisms have no limits (Melhus, 2016). In Sweden there are organizations such as Strategic Group for Rational Use of Antibiotics and Reduced Antibiotic Resistance (STRAMA) and the Swedish Public Health Authority who work hard with limiting the use of the drugs and spreading of drug waste. They work with healthcare, animal healthcare and meat industry to limit the use of antibiotics. Since the 1990s the use of antibiotics in Sweden is declining. The development is followed by the Public Health Authority who receives statistics about all the sold AB drugs from the pharmacists (Folkhälsomyndigheten, 2014).

Antibiotics in the society

The pharmaceutical industry is abandoning the AB production in spite of the fact that resistant bacteria are increasing. Of the 18 largest pharmaceutical companies, 15 abandoned the AB field. Since antibiotics are not used to treat chronic diseases but are used over short periods of time to treat infections, they are no longer considered an economic investment. This leads to a situation where the bacteria develop resistance to the existing antibiotics at a faster pace than new antibiotics will be discovered and produced. The loss of effective drugs like antibiotics to treat

infections will have a disastrous impact on patients and the general public at large (Lee Ventola, 2015).

Half of all antibiotics production is used by healthcare but the other half goes to the meat industry, not because the animals are sick but to fatten them. A great danger is that the AB are spread through nature. World health organization (WHO) and the Central Intelligence Agency (CIA) have identified another risk of multidrug-resistant bacteria as it could be used as a weapon of terrorism (CIA 2007). WHO has ranked ABR as one of the three biggest public health threats (WHO 2016).

Nurses´, students' and pharmacists' role

Preventing infection and reducing opportunities for microorganisms to pass between patients and staff is central to nursing care (Edwards, Drumright, Kiernan & Holmes, 2011). The doctors prescribe the drugs and together with the nurses they have an important role of keeping the use of antibiotics at rational levels. Nurses in Sweden are delegated larger responsibility regarding the patients than nurses in many other countries. The Swedish nurses are delegated to handle the acute medical situations. Specialized nurses also work with their own outpatient clinics for specific patient categories. The nurses give frequent telephone counseling to patients, often regarding infections. The nurse is the most important professional observer for the patient if the given treatment is ineffective. Therefore it is essential for Swedish nurses to have good knowledge about antibiotics, hygiene routines to avoid spread of infections and ABR (folkhälsomyndigheten, 2014). Lindberg, Skytt, Högman & Carlsson (2011) argue that Swedish nurses have insufficient knowledge in this field, lack of knowledge has also been revealed among health workers around Europe. Non-adherence to preventive measures to infection control as well as overuse of unnecessary preventive measures has been identified as consequences of knowledge deficiency. The nurses need greater awareness for limiting the spread of multiresistant bacteria and the consequences when not doing so (Lindberg, Skytt, Högman & Carlsson, 2011).

In India the nursing profession differs from Sweden. There are different types of undergraduate nursing educations in India. Auxiliary nurse and midwife, 2 years education, general nursing and midwifery, 3,5 years education and the bachelor of nursing science which is a 4 years education. There are options for further specialization and research (Indian Nursing Council, 2017).
The nurse's' role in India is traditionally identified with low caste. Therefore the occupation has gained low status. Even though nursing educations are increasing and there are demands on the labor market, many nurses chose to emigrate the country. In other countries they are hopeful to gain status and a better salary (Johnson, Green & Maben, 2014). However the nurses that remain in India are highly exposed to work related stress due to shortage of nurses followed by work

overload (Purohit & Vasava, 2017).

Indian pharmacists have a crucial role in the healthcare system. They work in the community, in college and in hospitals. They provide health screening services, have knowledge about law regarding drugs and conduct health awareness programs. In the hospitals they do drug interaction controls and provide drug information services to healthcare professionals (Dixon, Gharat & Raj Vaidya, 2014).

Micro, meso and macro levels

ABR is a relevant issue that needs to be addressed at an individual, organizational and global level. The micro level describes the resources of the nurse as an individual and the personal meeting between a nurse and a patient. The meso level describes the influence of organizations in the society as well as the ability to affect perceptions among groups. The macro level is the most abstract level. This refers to the overall structures in society, such as official laws and norms. From a macro perspective, there should be clear goals and values about how the care is ultimately designed at the individual level (Ternestedt & Norberg, 2014).

The United Nations (UN) described seventeen global goals about how to achieve sustainable development. Two of these goals were of special interest for this study. In one goal called health and well-being, ABR is stressed as a major problem in the pursuit of a sustainable global public health. The other goal, clean water and sanitation, describes the importance of clean water and sanitation, two components that are essential for combating ABR (UN, 2017). The goals can be considered to create structure on a macro level.

The one level that becomes the most interesting in this study is the micro level. This includes having knowledge and good intentions when it comes to ABR. An example of this is the nurse's' responsibility to provide patients with evidence based information, to educate the patient about the mechanism behind ABR and how to use the drug.

Relevance

ABR is rising overall in the world. As new resistance mechanisms are emerging the ability to common infectious diseases decrease. There is an emergent need to change the way professionals prescribe and people uses antibiotics. "Even if new medicines are developed, without behavior change, ABR will remain a major threat" (Medecins Sans Frontieres, 2017). Behavior changes include actions to reduce the spread of infections through vaccination, hand washing, practicing safe sex, and good food hygiene. Encouraging such behavior changes is one important task of the nurse. ABR has many unwanted consequences, like increased healthcare costs, unnecessary suffering, prolonged in-hospital care and mortality. India is one of the

world's most populous countries and is facing problems with ABR. An increasingly globalized world equals an increasing threat since resistant bacteria can reach us from all corners of the world. Bacteria are not limited by countries and borders, and the only way to defeat it is to work together internationally. That is why only a common global effort can help us prevent the growth of resistance.

Aim

The aim was to explore perceptions about antibiotics and antibiotic resistance among nurses, nursing students and pharmacists in rural India

Method

Design

A qualitative method (Kvale & Brinkmann, 2014) was chosen to explore this issue as this method allows collection of rich information and insight into the phenomenon under study. Qualitative research method allows understanding the feelings, values, and perceptions that underlie and influence behavior of the individuals. Interview approaches usually involve: direct interaction with individuals on a one to one basis or direct interaction with individuals in a group setting (Kvale & Brinkmann, 2014). Interviews on a one to one basis were chosen for collecting data.

Data collection

We believed that the best way to increase understanding was by interviewing the nurses, nursing students and pharmacists about how they handle antibiotics in their practice and their knowledge. The idea was to compare and describe the students´ theoretical perspectives to the nurses´ clinical perspectives about ABR. To get a holistic view nurses, nursing students and also one pharmacist were interviewed. Altogether the study contained of 11 participants, 5 nurses, 5 students from one single university and 1 pharmacist (table 1.). The nurses in the study had to have at least 5 years of working life experience. Semi structured face to face interviews (Danielson, 2014) were used to investigate the perceptions. Test interviews were made on Swedish students and nurses and the questions were improved afterwards (find appendix 2 & 3). The interviews with Indian nurses, students and pharmacist were held at a mutually agreed place with the participants. Each interview ranged between 30-45 minutes long and was held in a private setting. All but one of the participants chose to participate in the interviews. The interviews were audio recorded and later transcribed verbatim for the analysis.

Table 1. Participants

Title	Median of total work experience	Current semester	Average age	Number of Females	Number of Males	Participants in total	Loss
Nurse	8,3 years	/	29,5 years	4	1	5	0
Student	0	7th semester BSC nursing	21 years	5	0	5	1
Pharmacist	6 years	Assistant professor	33 years	0	1	1	0

Data analysis

Qualitative content analysis (CA) was used for this study (Graneheim & Lundman, 2003). This method was suitable for the study since the aim was to study the perceptions towards ABR among both nurses and nursing students and pharmacist. CA method allows to interpret from the content of different types of communication e.g. interview or text. The method can be used to investigate various themes such as structures of power, lived experiences, acts as well as spoken and unspoken rules. The method is used to interpret contents on different levels of abstraction. Manifest content is used when describing the visible and obvious components whiles latent content is used to analyze the underlying meaning of a text. However, the demarcation between these two concepts is obscure and can be combined depending on the outcome of the analyze objects (Graneheim & Lundman, 2003). The latent content consisted of what the participants said and the manifest content was expressed by the authors' interpretation of their underlying meaning.

In qualitative content analysis, data are presented in words and themes, and through comparing similarities and differences in the analysis, some interpretation of the results can be made. If the study is successful, the findings could be accurate enough for some universal generalization beyond the specific group of investigation (Bengtsson, 2016).

The most suitable unit of analysis is an interview or observational protocols (Graneheim & Lundman, 2003). The transcribed text was read several times to give the authors an idea of recurring and important details. Graneheim & Lundman (2003) describes the meaning unit as identifying words and sentences that can relate to each other in the text. Condensed meaning unit was the following step when shortening the unit of analysis while still preserving the core. Furthermore the

following step was condensed meaning unit with an interpretation of the underlying meaning, this would help find sub-themes and therefore formulate three themes (Graneheim & Lundman, 2003).

Ethical approval

The dean of the Manikaka Topawala institute of nursing, Charusat University, Prof. Anil Sharma has given the consent to interview students, nurses and pharmacist. All participants were given information about the study before the interviews were held and they were also insured that the participation was voluntary.

Result

The nurses were based on different wards and with different titles and were 26-34 years old. Three of the nurses worked in the Operation Theater (OT), one of them as OT in charge, one nurse worked in a general nursing ward and one nurse worked in outpatient care. All nurses but one was female. Most of the nurses had studied in various universities and worked at hospitals in different cities in India, all of them were now based full time or part time at the Charusat Hospital. The students participating in the study were all in the 7th semester and between 20-21 years. The pharmacist a 33 years old male worked as an assistant doctor and had 6 years of working experience.

The Data analysis revealed three themes with the subthemes describing the perceptions among nurses, nursing student and the pharmacist. The themes were summarized into one common main theme comprising ´It's out of my hands´.

Themes were

Table 2. Themes

Main theme: It's out of my hands

Themes	**Subthemes**
1. Lack of knowledge	**1.1** Misuse **1.2** Lack of association
2. Impact of the nurse's role	**2.1** Routines and recommendations **2.2** Willingness to spread the word for health promotion **2.3** Responsibility
3. Challenges of the society	**3.1** Beliefs in alternative medicine **3.2** Self-medication **3.3** Distrust in the healthcare system

1. Theme: Lack of knowledge

The findings showed that both students and nurses lacked knowledge about ABR. Other issues like misuse of AB were witnessed in the society and in the hospitals. Further, the participants were unable to see how AB could have a negative impact on the environment. Both nursing students and nurses had lack of knowledge regarding ABR however it seemed that the students had more knowledge than the nurses.

> *"Knowledge is not so much, but a little bit I have, maybe sometime antibiotic does not suit the patient, so patient get rashes and itching on the skin." (Nurse 2)*

The participants described a need for more information about ABR, stating that in India there are poor people who are more vulnerable to infections. Lack of resources may lower their immunity and they become more prone to infectious diseases. Lack of knowledge about medications combined with easy access leads to frequent and unnecessary use of AB.

> *"In India many villages are poor and they don't have balanced diet. They don't have good facilities, so that's why they can not eat well, and their immunity is low. In their body the infection is entering. In India, more people are getting all type of disease. So that's why they eat antibiotics." (Student 1)*

1.1 Misuse

Both nurses and students had witnessed some misuse of AB. The students believed that there was an overuse of antibiotics in the rural areas amongst the poor people. People preferred antibiotics over other medicine due to the rapid effect of the drug. One student shared her own experience about the misuse in her family:

> *"I'm coming from nuclear family and my father he's having hypersensitive reaction against dust and allergic to dust. So for this he use antibiotics, self-medication, means he will go buy (name of antibiotics) and take it. // It will have effect of the medicine then again he will get the same allergic reaction." (Student 5)*

Even the doctors misuse AB in the hospitals, they give a high dosage initially instead of adjusting the dose to the patient's needs.

> *"Antibiotics is used in minor cases, I'd say everyday in all hospitals. Some doctors use antibiotics on high levels to low levels but some doctors are good,*

they use normal level to high if necessary. But some doctors as I said start with high doses immediately." (Nurse 1)

The pharmacist was also familiar with doctors prescribing AB when it was not necessary. There were many explanations for why they were doing this. One of the main reason could be, the patients asking for quick recovery drug. Another reason was using AB for preventing further complications in the treatment when the patient had lower immune system. The ultimate reason seems to be a myth about AB being a safe cure for most of the conditions. Furthermore the pharmacist denied the fact that it would be possible to purchase AB without prescription from the doctor, claiming that the regulations were strict these days and stated:

"In India the scenario is different, doctors directly prescribe the antibiotics, and you are to go to the pharmacist store and you have to show the prescription."(Pharmacist 1)

However some of the nurses believed in physician's competence and did not believe that AB was used in the wrong manner or overused. They felt confident that the doctors were giving the accurate drugs and dosage to the patients. If the AB would become ineffective it was suggested that a other kinds of more effective drugs could be used or that different kinds of AB would be imported from other countries. A scenario without effective AB seemed to be unthinkable for most of the nurses.

1.2 Lack of association

According to the nurses, disposing AB in the nature is not dangerous as it is not hazardous material. They expressed doubts about if an animal came across the drug it could be problematic since no one knew how the animal would react to the drug. Students considered the environmental effect of AB in the nature as negative. However they were not aware of what the consequences from this might be.

"If you throw somewhere, not in this forest but on the road or somewhere were small kids are playing, they may eat it and this may affect them. I don't know exactly what happens. But for small kids it is dangerous and as well for poor people who are hungry, they may feel it's some food. So instead of throwing we should dispose it." (Student 3)

The pharmacies did not connect any association between manufacturers handling of wastes and its impact on the nature. According to the pharmacist manufacturers are not polluting the water in India as the manufacturers must follow governmental regulations. No connection between the use of AB and the environmental impacts was seen.

"I don't know about the environmental effect and antibiotic relations, that is again a different issue, that cannot be linked. ABR is a different issue and environmental effect is again another aspect." (Pharmacist 1)

2. Theme: Impact of the nurse's role

This theme describes how the nurses and students perceptions were shaped according to the nurse's duties and responsibilities.

2.1 Routines and Recommendations

The Nurse's Role had a crucial impact on the nurses´ and students´ perception towards ABR. The nurse's were obliged to follow the doctor's orders irrespective of recommendations from the guidelines. Only one nurse referred to existing guidelines while administrating AB, the rest said that the doctor told them what to do. All nurses except for one expressed trust in the doctor's orders. The nurses believed that the doctor always prescribed the right dosage and type of AB and felt no need to doubt about given instructions. However, the nurses expressed that they had no rights to question doctor´s orders. Sometimes nurses had strange feelings but they had to keep their doubt to themselves since they could not argue about medications or doctor´s expertise.

"[Laugh] I can't change anything. Because frankly I would like to tell you that I'm not doctor, I'm a nurse and also only nurses having duty that, what doctor is written in order, that only we have to follow, so." (Nurse 3)

All nurses agreed that the guidelines that existed in the hospital were important to follow. They mentioned that guidelines existed for high risk medicines, narcotics and waste management. Data showed that participants knew these guidelines well and they all agreed these were crucial to follow, mainly for the safety of the hospital staff and for stopping the spread of infections. Use of protection such as gloves was also acknowledged as important hygiene routines for the safety when giving injections to the patients.

"Our protection and patient protection also. If our hand is dirty and infected and we are giving antibiotic, then also patient having infection. So before giving procedure we have to have gloves on. Which procedure, not only giving antibiotic, anything we have to wear." (Nurse 4)

2.2 Willingness to spread the word for health promotion

A will to improve knowledge and responsibility was expressed by the nurses. The students felt a responsibility to share their knowledge with the people in the rural areas when they went for community posting. The nurses wanted to increase the knowledge among themselves to prevent ABR.

"Here we start with our self. We should not take self-medication and we should educate the patient. Doctor will not always be with patient but nurse will be with patient more, the relationship will be more trustable so the patient and family will listen more to the nurse. Which I have experienced, nurses have more time to explain. We have even community posting in rural area, this is preventing. So we go daily for home visits. Community people will not go daily to the hospitals, so we do educate according to their needs." (Student 5)

2.3 Responsibility

Responsibility in handling AB and preventing ABR was a matter of discussion among the participants as the perceptions were widely diverse.

When administering AB it was the nurse or the caretaker who had the responsible for giving the accurate dose. However if there were any doubts, it was possible to consult the doctor. The patient had no personal responsibility, however sometimes the family could be educated and then be given some responsibility regarding the treatment. Informing the patients about AB was seen as doctor's responsibility according to the nurses. As a consequence the nurses did not provide information to the patients. The students however thought that the nurse had a crucial role to inform the patient about their treatment. They were facing a different issue regarding how much information the patient actually applied to their lifestyle.

"The patient aren't aware of how big the doses are and how many they should eat. But family members is educated and they ask what is this drug, so sometime the family members are responsible." (Student 4).

Some thought it is the doctor's or the pharmacist's responsibility to prevent ABR from spreading. Other felt it was the Management's responsibility since they were the ones deciding what the doctors would do. The responsibility was also considered to be shared by all professions and patients. A fundamental change was considered necessary when preventing ABR from spreading. One student wanted to implement a new law that would make AB illegal to sell to people without prescription. One nurse wanted to ban high cost AB so that drug manufacturers and hospitals would not be able to profit from them. The same nurse also suggested governmental subventions for AB as a solution for this.

"It's like hierarchy. First consultant is written write the order. Then they are given the order to medical officer then they are prescribed, they are giving to nurses, nurses have to give to the patient. So all are responsible for that. It is teamwork, hospital is always it will be team work, not only one person is responsible. Right?" (Nurse 3)

Limiting the use of AB and the importance of knowledge was highlighted whereas others felt no need for changes as their work in the hospital went accordingly.

> *"It is going smoothly. // But we are working to protocol only, according to guidelines, so there is no any need to change." (Nurse 3)*

3. Theme: Challenges of the society

3.1 Beliefs in alternative medicine

Belief in alternative medicine was another finding. Sometimes the natural medication can be an element of the peoples believes but it is also a matter of tradition among the Indian people. Many prefer the wisdom of the old traditional remedies prior to the new western medicine.

> *"Yeah I think, but mostly as for my experience the people, they are many people they take herbal medicines, natural medicines. They don't prefer all that we have knowledge about, drugs, they prefer naturally. Some believes they have. And there are even if we don't believe. In India actually we prefer the natural medicines like homeopathy, but they don't go for doctors and many patients got recovered from that also."(Student 3)*

Natural medicine was proposed as an alternative that could be used to decrease overuse of AB. It was mentioned that the drug companies should develop herbal medicine as a substitute to AB.

> *"It should be the antibiotic manufacturer, they should go for herbals. They should bring herbals in the field of this health sector, because natural things can also cure our disease, it can prevent and doesn't have side effects. It takes time but it may cure it so. I can say AB could be preferred and natural medicines also it should be there." (Student 3)*

3.2 Self-medication

Though alternative medicine was recognized as positive it could, according to the participants, be a problem since people would self-medicate instead of going to the hospital when truly needed.

Instead of going to the doctor multiple times and pay high fees people prefered going to the pharmacist and buy medication for their symptoms directly. Students experienced while going for community posting that at least one family member in a household would self-medicate. This showed to be a problem among the students as

well.

"So they are preferring self-medication because previously they went to the doctor and they take the name of that particular medicine and so if someone in the family have the same symptoms they will go for the same medicine rather than go to doctor and pay a fee. Fees is more here, so they will go only to the farmaceut and buy there." (Student 5)

3.3 Distrust in the healthcare system

Another finding was distrust towards the healthcare system. Since the patients are paying for their own treatments in the hospital there were suspicions of corruption. This was described as the hospital management was earning money when prescribing high cost AB to the patient, leaving the participants with the feeling of hopelessness.

"Actually I don't like anything done in Indian hospitals. It is only a market.// It's a game with the patient's life. // I feel, I want to leave India. Because of this reason." (Nurse 1)

There were also concerns regarding the doctors getting compensation when signing contracts with pharmaceutical companies.

"When on clinical posting some drug manufacturer company come to represent new medicines. If the company gets contract with the hospital the doctors are going to make money. // Even it might be that companies sometimes selling bad medicine. So there should not be any contract, doctors should think that this medicine will affect negatively." (Student 5)

Main theme: It's out of my hands

Summoning all themes one main finding was discovered. The participants felt that the situation of antibiotic resistance was out of their hands. They did not have the sufficient knowledge nor the influence to make an impact of the situation. The hospital hierarchy did not allow nurses to speak up to the doctors and as a consequence the nurses had little impact to make changes. Mistrust from the society also made the nurses impact limited. Nursing students had some basic knowledge about AB but, as foll all the participants in the study, they were lacking the ability to associate misuse of AB with ABR. ABR was acknowledged as a problem but a problem that could probably be handled by someone else.

Discussion

The aim of the study was to identify perceptions towards AB and ABR among nurses and nursing students in the rural area of India. Qualitative method was used where one on one interviews were made with 11 participants. The main finding of the study was the perception saying ‘It’s out of my hands’. Further perceptions were identified in three themes: lacking of knowledge, impact of nurse’s role and challenges of the society, followed by subthemes.

Result discussion

On macro level the nurses experienced a mistrust against management, this would make them feel that their role in reducing the spread of ABR were insignificant. Furthermore the nurses were facing other challenges such as the society not wanting to adapt the evidence based medicine.

On a meso level there were lacking of knowledge regarding ABR that could be linked with the traditional education system. The nurse's role was described as limited as there were strict hierarchy and no chance for the nurse to express themselves. Their competence was not used to its full capacity. This made the nurses unengaged since they did not feel need to dedicate themselves to the fullest in their job. On a micro level the perceptions amongst the nurses and students can be described as wanting to do a good job but feeling that ABR was not their problem to solve since the responsibility lay in higher power. If guidelines were implemented they would have been happy to follow them.

Although both nurses and students were lacking knowledge about ABR they did have some knowledge about AB. This knowledge could have been used to identify relations between cause and effect. Still there was something missing, the participants could not associate the misuse of AB with ABR. There was no understanding that it would be dangerous to expose nature to AB because humans and animals would get affected by this. Similar results were found among medical students in southern India, as their perception is described as causal regarding the use of antibiotics. Nevertheless the students were aware of the antimicrobial resistance (Khan, Banu & Reshma, 2013). The pharmacist was also familiar with the challenges regarding ABR but could not link it with the environmental impact. Naturally this affected the participants perception towards AB. Proper waste disposal in the hospitals were considered to be of importance but mainly to protect the hospital staff from getting infections rather than protecting the environment. Luckily a proper waste management system will do both, but the concern about the

nurses perceptions remains. The reason for this lacking of correlation might be explained on a Meso level by the following; the Indian education system and nurse's role.

Most of the education in India is taught in the traditional lecture method. In Sweden, the pedagogic is based on student centered learning. This kind of pedagogic is based upon two way communication and interaction in form of workshops and debates about different subjects.
Both models have pros and cons. The lecture-based teaching is cheaper since high technology devices are not needed. The classes are more disciplined than modern teaching. However this method takes no notice of the diversity among the students. Since learning is a creative process the teaching should be active for the students as well. The modern learning is focusing on pedagogy, identifying the diversity among the students, and is shaped to make teaching stimulating for all. The individual student is given a larger responsibility and the teacher has an observing role (Feleey & Biggerstaff, 2015).

The exact consequences of the diverse learning systems are hard to specify. In this study it was discovered that the participants were lacking the ability to apply their knowledge to make their own patterns between different problems that could be linked. Perhaps this was the result of lack of training in critical thinking. If the participants would have attended modern teaching classes maybe they would have been able to see the patterns between how AB effect both animals and the environment, since it is all connected. Consider they would have this kind of education, the participants perceptions may have been different. Perhaps that would result in a contribution to the decrease of AB spreading in the environment since the nurses and students would have been able to spread the knowledge about waste management and why to be precautious with the drinking water.

The knowledge gap between the students and nurses was unexpectedly large. Apart from a deeper understanding about AB, the students also had better capability to see the patterns between the overuse of AB and ABR. The reason for this could be the nurses had forgotten the knowledge they had gained during nursing school. Whereas for the students this knowledge was recently gained. Students may also be more optimistic and open to learn, as their optimism has not yet been challenged by the hierarchy in hospitals. The difference may also be due to the fact that the nursing education in India has developed for the better and the students have adapted a more critical way of thinking.

Within the framework the nurses could do an outstanding job practically and socially in the meeting with different patients. The framework however was described as limited, beyond guidelines and doctor's recommendation the nurse was not authorized to get involved. It is easy to imagine such circumstances would decrease the engagement in what is not on one's table. When handling AB the nurses were only authorized to do what they had been told and they were not allowed to question the delegations. Even if they wanted to they were only left with an uncomfortable feeling. Perhaps this was one contributing reason for the nurses lack of knowledge about ABR. Unless they were directed to, why would they find the information themselves when still there was nothing they could do to affect the situation. To make the nurses more engaged in the ABR the hierarchy structure in the Indian hospitals need a fundamental change. The nurse is the one working close to the patient and could be used as a resourceful link between the patient and the doctor. In preventing ABR the nurses play an important part minimizing the spread of healthcare associated infections. On micro level the nurse should have the power to affect the treatments, making sure patients receive accurate healthcare and follow the treatment process. Malik, Dhar & Handa (2016) states that Indian nurses who practice authentic leadership shows more creativity, knowledge and learn more by sharing their knowledge with each other. To improve the working conditions promoting creativity is a need, rather than an option (Rego, Sousa, Marques & Pina e Cunha, 2012)

One finding that had impact on the participants perception was the fact that it is possible to purchase AB without a doctors' prescription in India. This was stressed by both nurses and students although it was dismissed by the pharmacist. The possibility to purchase AB over the counter is not desired as this will increase the use of the drug. Though in India the scenario is somewhat complex since the lack of access to effective and affordable AB is causing death of more children than ABR itself does (Laxminarayan & Chaudhury, 2016). Infection control in hospitals is poorly monitored and could be improved. The discussion about whether AB should be sold over the counter has been taking turns in the country (Laxminarayan & Chaudhury, 2016). The Guidelines For Optimizing Use Of Key Antimicrobials published by the National Centre for Disease Control (2016) says:

> *Prescribing antibiotics just in case an infection is present is rarely justified. Where patients are in hospital, close observation is usually a better option until the diagnosis is made. (p.44)*

Furthermore the guidelines discuss the importance of tracking antimicrobial use to follow the emerge and spread of resistance (National Centre for Disease Control, 2016). However it is not mentioned weather purchasing AB over desk should be legal. Ganguly et al. (2011) stated that over-the-counter purchase in India was about to be banned. Whether the ban was implemented or not, the patients are still buying their AB over the counter rather than paying for costly hospital visits. This results in a situation that gives the nurses lack of influence and the ABR keeps spreading in a hase.

Corruption between the hospitals and the drug manufacturers was suspected by the participants. Laxminarayan & Chaudhury (2016) explain that compensation is known to be given to the doctors from the pharmaceutical companies in exchange for an AB prescription. Seen from a Macro level this created distrust towards the healthcare system amongst the nurses and the nursing students. They believed the corruption would have a negative impact on patients care. As regarding the distrust against healthcare system it could have severe impact on the nurses' future perceptions. They may be even more negligent regarding the ABR in the future. The nurse is put in an uncomfortable seat because she cannot rely on the healthcare system to do what is to be done to ensure that the patient is in a health condition. Again the need for fundamental changes in the Indian healthcare system is identified.

Furthermore engagement from the locals, at the macro level, was not as easy to obtain as the traditions of the Indian society is based on strict religion and caste system. The caste system creates specific roles for different groups in the society. This is seen as an obstacle as it restrains people from involve in healthcare. A consequence of this is self-care. Self-care is defined as health-generating activities that are undertaken by the person itself to prevent disease. These activities are initiated without professional assistance therefore the responsibility should lie within the individual and the community (Park, 2015). This leads to higher demands on those who self-medicate and shift responsibility from the nurse. Eventually the nurse will have no influence over the population. This phenomenon was persistently revealed in the interaction between nurses and patients. The nurses again felt jaded.

The goal of evidence-based medicine is no longer treatment of disease, the millennium development goals that WHO has declared is today to prevent disease and promote health (Park, 2015). The participants expressed a willingness to work with health promotion to prevent ABR. Another solution was shedding a light on Ayurvedic medicine, an ancient knowledge that has been practiced in the Indian

society since 5000 B.C (Park, 2015). As the evidenced based medicine was questioned among the people the Ayurvedic medicine was saluted. It is also described in similar research that nursing students in India have a positive attitude towards Ayurveda. By integrating alternative healthcare with conventional medicine in the nursing curriculum the nurses would be better in providing the patients with care (Poreddi, Thiyagarajan, Swamy, Ramachandra, Gandhi, Thimmaiah & BadaMath, 2016). This implicate a solution to the ABR and the Indian people would perhaps be more receptive towards the healthcare system if it did not neglect their ancient believes.

Method discussion

Diversity was important for the study since it would make the findings more accurate for generalization. Therefore nurses in different fields and with different titles were chosen to participate. It was preferable to have students in the last year of bachelors since they were more likely to have been in contact with antibiotics in their education. The participants were all female except one, this could have an impact on the study since India is strongly affected by the patriarchy and the hierarchy in the society. As the nursing field is female dominated the sample could also be seen as presentable.

The interview technique was chosen since it was most likely to provide a justified view of the participants' perception. Similar result could be found in previous studies on the same subject. Lindberg et. al (2011) described the Swedish nurses lack of knowledge in the subject of ABR.

Validity was ensured during the interviews, adjusting the questions and making them relevant for the participants' level of knowledge as well as suitable in the pursuit of answering our aim. Although the questions were adjusted they still preserved their core. Bias was discussed by the authors several times before the study began. Bias could arise if the author's own prejudices took over the interpretations of the answers. However being completely objective may be difficult as preconceptions are a part in how people are coping with daily life. As for the participants there was a risk that they would feel reserved when sharing their experiences with strangers. Some of the findings could be transferable in private hospitals in the rural area of India. However other findings could be transferable in broader settings. e.g. the students being more optimistic than the nurses and nurses feeling neglected due to the strict hierarchy.

The advantage with using a semi-structured interview guide was that the questions could be adjusted depending on how much knowledge the participant had regarding the subject. Moreover, the probe questions were asked for further clarifications.

During the interviews one of the writers was the main interviewer and the other one was the observer. This allowed one of the writers to pay full attention to the answers and the other one could focus on nonverbal cues. English was not the mother tongue of the interviewer nor the participant's so there were some language barriers. Therefore being two interviewers were preferable since both could explain the questions in different ways if needed.

The Indian setting is based on strict hierarchy. Even though it was prefered from the authors that participating in the study should be voluntary, the participants were told to participate from higher authorities. An information letter was sent on forehand to India, though it came to knowledge that the participants never had opportunity to read that letter. Therefore the interviews started by reassuring that the participation was voluntary. All participants but one showed genuine willingness to participate in the study and expressed happiness for being chosen. One student, however, seem terrified and would not speak one word. This participant was considered as a loss and the authors tried to ask the authorities for another participant without revealing the identity. No other participant was given.

Further ethical challenges in the Indian setting were one of the interviews held with a nurse that was accompanied with a hospital manager. This setting cannot be considered as private and did probably affect the nurse’s answers. Due to hierarchy the authors could not argue this arrangement. Some of the participants felt uncomfortable being asked questions were they lacked of knowledge. One participant offered to reschedule the interview and do some research on the field. The authors tried to create a comfortable environment and explained that the study was meant to explore the nurses’ current perception.

Conclusion and clinical implications

India faces a major problem with ABR as its residents are severely affected. Healthcare shows shortcomings and that the nurses’ role is not explicit. To meet the challenges, extensive changes are needed at both organizational and individual level. This study indicates that there is urgent need for incorporation of this kind of knowledge in nursing education. ABR is not limited by countries and borders and has become one of the greatest threats to global health.

Further research

Further research is necessary to affect the perceptions at the different levels as resistance development is a growing problem.

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Appendix 1

Dear participants,

We are two nursing students from the University of Gothenburg in Sweden that are writing our bachelor thesis about Antibiotic resistance in India. Antibiotic resistance is a subject that is of genuine importance to us on a political and global matter as well as in a personal and professional one so we are really looking forward meeting you.
Globally the resistant bacterias are spreading fast, in Sweden there are organisations such as STRAMA and the Swedish Public Health Authority who work hard with limiting the use of the drugs and spreading of drug waste. They work with healthcare, animal health care and meat industry to limit the use of antibiotics. Since the 1990-th century the use of antibiotics in Sweden is dropping. However this differ from many other countries in the world. In South East Asia it is estimated that a child dies every second due to failed attempts to treat resistant antibiotics. India is facing a large problem with resistance developing bacterias. The problems goes out to many different parts of the society, such as drug manufacturers polluting the drinking water, inhabitants lacking of sensible sanitation, virus infections spreading and antibiotics being cheap and easy to get hand on. Our interests lies in understanding how our Indian colleagues are dealing with the challenge ahead of them.
We would like to talk to nurses who are in contact with antibiotics in their daily work. We are interested in investigating the perceptions towards antibiotic resistance. Our questions will be about your daily work with antibiotics, your knowledge about it and resistance developing. We will ask if there are rutins in handling antibiotics in your daily work. How you handle the waste after using antibiotics and what you think could be done better in the handling of antibiotics.
To do these interviews we would preferably talk to nurses but also nursing students who can express themselves in english and who are in contact with antibiotics in their daily work.
For us it is important that all participation in the interviews is voluntary. Not only because we value your own personal opinion but also to get a truthful picture of your reality.
Looking forward to meet you and we are the most thankful for this opportunity

Yours sincerely
Sonya Ibrahim and Camilla Jämting

Supervisors
Dr Harshida Parel
Prof Anil Sharma

Appendix 2

Nursing students

1.
a) Could you please tell me what you know about antibiotic resistance
b) Do you feel that you have enough knowledge about it?
c) Where did you get the knowledge?
d) If you would like to know more, where would you receive information?
e) Do you believe that antibiotics is wrongly used?

2.
a) What are your thoughts when you hear the term antibiotic resistance?
b)How does it make you feel?
c) Antibiotic resistance is spreading fast around the world. Due to this the manufacturers don't see profit in making new antibiotics, ultimately this leaves us with no cure for the resistant bacteria. What do you think when you hear this? How does it make you feel?

3.

a) Antibiotic resistance is a problem globally, how do you think it specifically affects India? Who do you think is affected by the antibiotic resistance?
b) Is it important handling the waste in any specific way? What happens if you don't?
c) How does the resistant bacteria spread?

4.

a) With who lies the responsibility to prevent antibiotic resistance? (Nurse, doctor, patient, farmaceut, society, politics?)
b) What responsibility does nures have preventing antibiotic resistance from spreading?
c) What is your responsibility as a student/ nurse when preventing antibiotic resistance?
d) What advice would you like to give to the patient to prevent antibiotic resistance?

5.

a) What do you think could be improved in the handling of antibiotics?
b) What do you think could be improved in preventing resistance?
c) What would you change if you could?

Appendix 3

Nurses/ Pharmacist

1.

a) Could you please tell me everything about how you deal with antibiotics in your daily work? / How do you handle the antibiotics?
b) In your opinion do you have good knowledge about antibiotics? Please tell me what you know.
c) Do you feel that you have enough knowledge about it?
d) Where did you get the knowledge?
e) If you would like to know more, where would you receive information?
f) Do you believe that antibiotics is wrongly used?

2.

a) What are your thoughts when you hear the term antibiotic resistance?
b) How does it make you feel?
c) Due to the resistance is spreading so fast the drug manufacturers don't earn money on inventing new types of Antibiotics. Therefore many manufacturers are stopping their produce of new Antibiotics. This may lead to resistance spreading and no alternative cure. What do you think when you hear this? How does it make you feel?

3.

a) Does your ward have any specific guidelines or routines while handling antibiotics?
b) Do you use any kind of protection while handling antibiotics?
c) Does the antibiotic resistance affect your daily working life?

4.

a) Antibiotic resistance is a problem globally, how do you think it specifically affects India?
b) Who do you think is affected by the antibiotic resistance?
c) How do you handle the waste after using antibiotics?
d) Is it important handling the waste in any specific way? What happens if you don't?
e) How does the resistant bacteria spread?

5.

a) With who lies the responsibility to prevent antibiotic resistance? (Nurse, doctor, patient, farmaceut, society, media, politics?)
b) What responsibility does nurses have preventing antibiotic resistance from spreading?
c) What is your responsibility when preventing antibiotic resistance?

6.

a) What do you think could be improved in the handling of antibiotics?
b) What do you think could be improved in preventing resistance?
c) What would you change if you could?