



“Investigating the role of pharmacist to control antibiotic resistance and Antimicrobial stewardship”

Submitted To:

Department of Pharmacy

Daffodil International University

ID No: 0242220011093021

Submission Date: 19. 01. 2024

Department: Department of pharmacy

Institution: Daffodil International University

Approval

Approval has been granted for the project survey that explores the pharmacist's role in managing antibiotic resistance and antimicrobial stewardship. This submission to the Department of Pharmacy at Daffodil International University has been deemed satisfactory for the partial fulfillment of the Masters of Pharmacy degree requirements, and it has received approval .

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DECLARATION

I affirm that I have conducted an investigation on the pharmacist's role in controlling antibiotic resistance and antimicrobial stewardship under the guidance of

Associate Professor Department of Pharmacy Daffodil International University from the , Faculty of Allied Health Sciences at Daffodil International University.

This project is an original work, and I confirm that it has not been submitted for any other degree.

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Introduction

Modern medicine is confronted with one of its greatest obstacles in the form of microorganisms that have developed resistance to numerous intervention and the aforementioned phenomenon, known as antibiotic resistance, contributes substantially to the severity of diseases, healthcare expenditures, and global mortality rates so, as an immediate investigation and delineation of the function performed by chemists, who are pioneers in the field of medicine, is imperative in the struggle against antibiotic resistance (Pulcini et al., 2018).

Regarding this particular situation, Pharmacists execute a function that is absolutely critical and they occupy a distinctive position within the healthcare system due to the substantial function they execute, which is to facilitate the communication between prescribers and patients and they are widely recognised as frontrunners in the field of antibiotic treatment administration and distribution owing to their accessible nature to the general public and extensive knowledge of pharmaceuticals that is why components of this policy include the education of patients regarding the proper utilisation of antibiotics, the prevention of antibiotic misuse, and the observance of prescribed treatments.

Furthermore, Pharmacists assume a substantial role in antimicrobial stewardship endeavours, which strive to minimise the transmission of resistant microorganisms and minimise the negative consequences of antibiotic use while simultaneously achieving optimal disease treatment and they are frequently required to perform duties such as evaluating antibiotic prescriptions, monitoring medication interactions, and providing feedback on treatment modifications as part of their participation in these programmes.

The escalating prevalence of antibiotic-resistant microorganisms, coupled with the antiquated rate of drug discovery, underscores the critical nature of promptly confronting this issue and within this context, chemists assume a pivotal function in addressing a worldwide health concern, thereby transcending their customary function as providers of pharmaceuticals and to ascertain the potential contributions of chemists towards mitigating antibiotic resistance, an examination of their involvement in policymaking, teaching, stewardship, and collaboration with physicians and other medical practitioners is imperative.

The objective of this study is to examine the various potential contributions of pharmacist to the fight against antibiotic resistance, the ramifications of their efforts on public health and patient outcomes, and strategies to promote greater participation of pharmacist in this critical healthcare concern so by dedicating effort towards comprehending the functions of chemists and exploring potential applications of their knowledge, it is possible that we could more effectively manage the escalating problem of antibiotic resistance and, ideally, eradicate it entirely.

Literature review

The escalating problem of antibiotic-resistant bacteria and viruses is without a doubt one of the most substantial obstacles presently confronting global health and the objective of this literature review is to compile scholarly articles that examine the contributions of chemists to antibiotic resistance prevention and control that is why the scope of this research encompasses everything that is mentioned below: interventions conducted by pharmacist, patient education initiatives, activities related to antimicrobial stewardship, and multidisciplinary teams.

The function of chemists in identifying trends in antibiotic prescriptions has been the subject of numerous investigations and antibiotic prescribing practices were found to be significantly improved by hospital pharmacist-led interventions, such as prescription reviews and feedback to prescribers (Gilchrist et al., 2015). Baur et al. (2017) found a similar pattern, namely that chemists' participation in antibiotic stewardship programmes improved patient outcomes and was associated with lower bacteria resistance rates.

It must be emphasised that Patel et al. (2016) laid up a strategy for pharmacies to prevent antibiotic overuse through individualised patient counselling and our previous results are supported by this finding (Smith et al., 2015) so it is the vital duty of pharmacist to provide information about antibiotics and so research by Jamshed et al. (2018) indicates that pharmacist-led patient education initiatives greatly enhance knowledge about antibiotic resistance and the importance of strictly adhering to prescribed antibiotic regimens.

It is also notable that building a strong foundation on interdisciplinary teamwork is essential for fighting antibiotic resistance as Smith et al. (2015) and Ashiru-Oredope et al. (2016) both found that healthcare professionals, including chemists, must work together to develop and

implement effective antibiotic stewardship strategies and that also in additional research has shown that these individuals can help reduce antibiotic resistance and enhance antibiotic management when they work in interdisciplinary teams.

Pulcini et al. (2018) investigated how much sway pharmaceutical experts have over antibiotic policy in healthcare systems as well as pharmacists ability to devise and implement plans to reduce antibiotic resistance and found that antibiotic stewardship initiatives have had some success, but chemists are still not fully involved due to several obstacles and inadequate training, inadequate recognition, and inadequate funding were the three common challenges noted by Drekonja et al. (2017) and so, it is imperative that future research focuses on addressing these challenges and finding new ways to get pharmacist involved in the fight against antibiotic resistance.

The paper also argues that chemists are pivotal in the fight against antibiotic resistance because of their work in several areas, including policy engagement, patient education, collaborative practices, therapeutic treatments, and more and the fact that pharmacist, despite challenges, may make significant contributions to fixing this global health crisis is also beyond dispute so additional research and financing for efforts led by pharmacist are vital given the progress made in this critical field of medicine.

Methodology

Research Philosophy

Throughout the whole of the research process, positivism will be preferred. The use of quantitative methods was the primary factor that had a role in the choosing of this philosophical framework. The positivist approach and the quantitative method are complementary to one another in the field of scientific investigation. A higher possibility of achieving the desired result may be achieved by simultaneously putting into action two different methods. For this reason, Personally pondered about whether or not to adopt this viewpoint throughout the course of the process of data gathering and study analysis

Research approach:

Instead of going with the alternate technique, Made the decision to evaluate the study utilizing the deductive method and one of the fundamental justifications for selecting this strategy is the development of a good comprehension of the original research methodology and as stated by Thomas et al. (2020), the investigator's goal was to acquire relevant data from primary sources over the course of their investigation so that is why the use of the deductive research approach will thereby ensure that the preliminary data collecting is successful and as a result of this, the researcher made the decision to make use of deductive reasoning in order to guarantee that the study would be successful (Thomas et al, 2020).

Research strategies:

For the purpose of the study, the technique will make use of the survey, which is the instrument that is used in research the most often and some of the key data gathering questions that may be asked of respondents throughout the course of a survey are provided below. Structured, semi-structured, and unstructured questionnaires are the three basic kinds of questionnaires that are available. Have come to the conclusion that the most effective way to collect all of the required information from the individuals who are taking part in this experiment is to make use of a structured questionnaire format.

Research choice:

Monomethod research is the one that has the most traction among the available choices and the researcher has decided to carry out the investigation using this monomethod approach in order to collect the necessary data and develop the evaluation for the report. When using the monomethod approach, researchers are required to make a choice between quantitative and qualitative methods. Through the use of the empirical data, Had the intention of arriving at a valid conclusion. One possible explanation for this outcome is the use of quantitative methods. Utilizing a quantitative approach was the first step that the investigator took in the process of conducting the investigation (Pulcini et al, 2018).

Data collection:

As stated previously in the discourse, the essential data needed for the study will be gathered through primary research. Furthermore, the researcher shall employ a structured questionnaire methodology to construct a series of inquiries. As a result of the considerable

geographical separation between Bangladesh and the country under investigation, conducting in-person interviews is not feasible. As a consequence, the researcher will elect to conduct the interview via telephone as a means of obtaining primary data.

Data analysis:

During the phase of data analysis, the goal was to make use of software that contained characteristics that made it suitable for usage by customers. During the process of data analysis and assessment, the researcher discovered that Microsoft Excel and Microsoft Word were the apps that were the most suitable to use. In light of this, the approach that will be used for the examination of the data will incorporate the usage of Microsoft Word and Excel files. Excel is going to make the process of data interpretation much easier. Furthermore, Microsoft Word will prove to be a useful tool for the researcher in the process of developing a framework for the assessment report that is visually beautiful (Thomas et al., 2020).

Sampling:

Probability sampling will be used as the technique of sampling for the study that will be carried out. There are many different types of probability sampling, and have the flexibility to choose the one that best satisfies criteria from among these options. Eventually decided to go with the most fundamental kind of random sampling out of all the many probability sampling versions. Through the use of this strategy, the selection procedure will be carried out in a fair and impartial way. A selection of twenty-five items has been made for the sample. Staff members from the mid-level positions (includes PMO who goes around in various hospitals) of Square Pharmaceuticals Limited will be present for the celebration.

Primary Investigation

In the survey results the role that pharmacist play in addressing antibiotic resistance was investigated and here are the responses that were recorded for the survey questions.

Overview

Because the global health community is currently facing a severe threat posed by antibiotic resistance, it is necessary to have a comprehensive grasp of the role that pharmacist play in the process of addressing this issue and within the context of the management of antibiotic resistance, the purpose of this study is to investigate the attitudes, behaviours and knowledge of 15 medical assistant of Combined Military hospital-Dhaka CMH (Medical Word – 1) & 10 staff members who are working at Square Pharmaceuticals Limited.

Survey questions and the responses

1. How frequently do pharmacist invest a great amount of time in hospitals for prescribed medicine?

How frequently do chemists invest a great amount of time in your hospital for prescribed medicine?		
Perception	Percentage	Number of Respondents
Highly Agree	35%	10
Agree	30%	8
Disagree	20%	4
Highly Disagree	15%	3

Table 1: Frequency of Time Investment for Prescribed Medicine

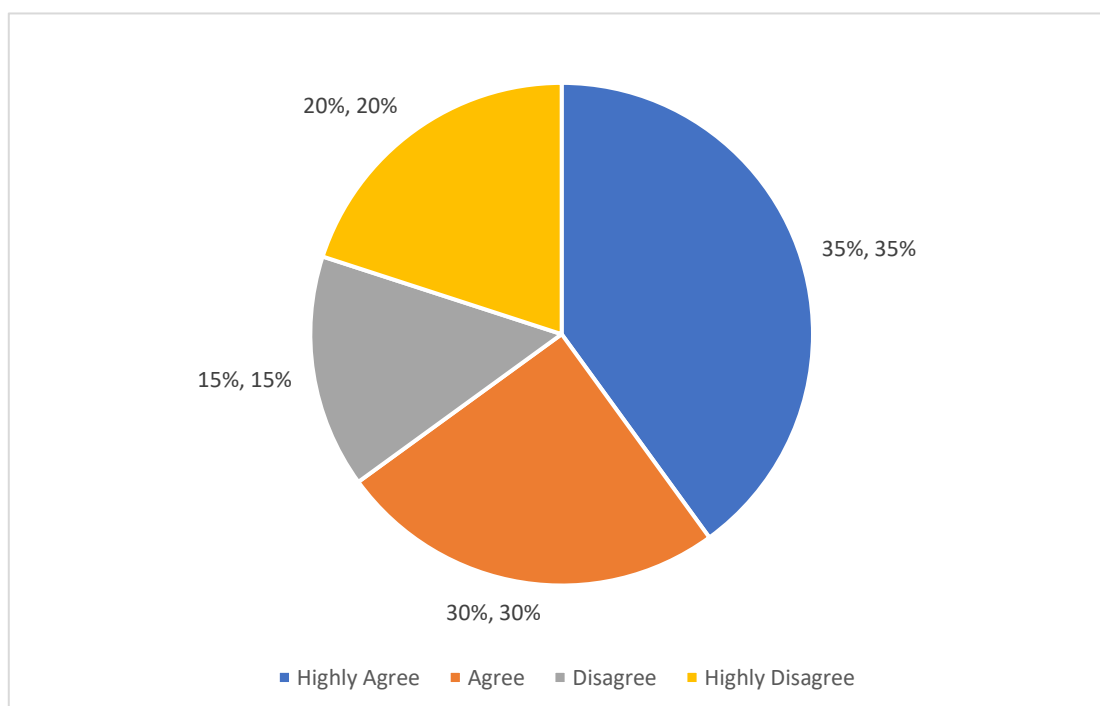


Fig 1: Graphical representation of the results

Primary Finding: A total of thirty-five percent 35% of respondents highly agreed based on the following question regarding the concerned question. 30% of respondents agreed with this mentioned survey question. 20% disagreed whereas 15% highly disagreed.

Analysis: This result shows that chemists in hospitals mostly invest a great amount of their valuable time in researching and processing all the effective issues caused by antibiotics.

2. Do pharmacist are responsible for their research and results in orientation based on prescribed medicine?

Do pharmacist are responsible for their research and results in orientation based on prescribed medicine?		
Perception	Percentage	Number of Respondents
Highly Agree	35%	10
Agree	30%	8
Disagree	20%	4
Highly Disagree	15%	3

Table 2: Research and Result Validity of Chemists Based on Prescribed Medicine

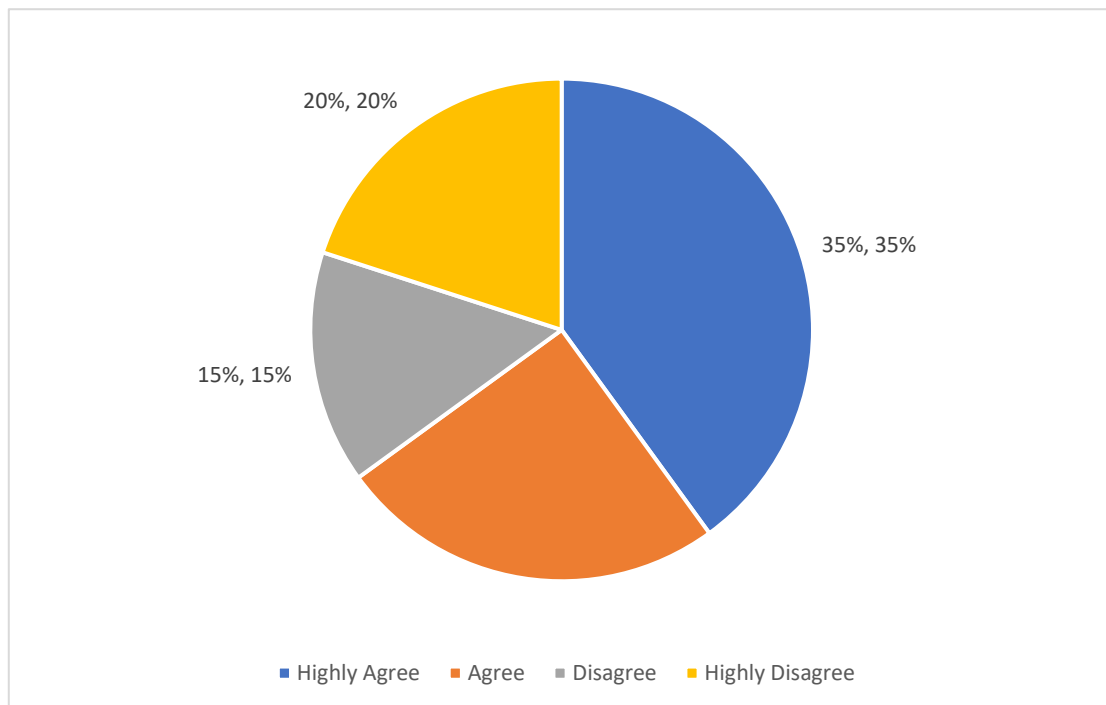


Fig 2: Graphical representation of results

Primary Finding: A total of thirty-five percent 35% of respondents highly agreed based on the following question regarding the concerned question. 30% of respondents agreed with this mentioned survey question. 20% disagreed whereas 15% highly disagreed.

Analysis: This result shows that pharmacist in hospitals mostly invest a great amount of their valuable time in researching and processing all the effective issues caused by antibiotics.

3. What is the frequency of hospital authority taking all the risk factors in a very sensitive way?

What is the frequency of hospital authorities taking all the risk factors in a very sensitive way?		
Frequency	Percentage	Number of Respondents
Regularly	80%	20
Occasionally	20%	5

Table 3: Frequency of Hospital Authority Taking All the Risk Factors in a Very Sensitive Way

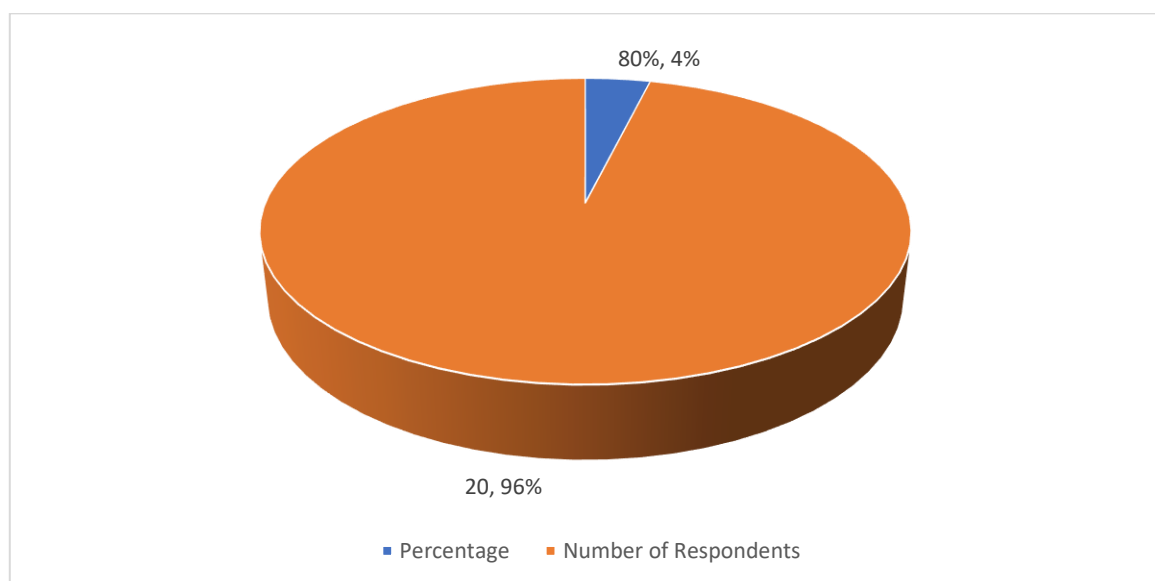


Fig 3: Graphical representation of results

Primary Finding: A total of 80% of respondents stated that the hospital authority is quite regular in the process of taking risks based on sensitivity to the issues handled within the hospital's capability.

Analysis: This result shows that authority and the integrated personnel in hospitals mostly invest proper concentration on processing all the effective issues caused by antibiotics.

4. How hospital can face antibiotic precautions for patients during their antibiotic course?

How hospital can face antibiotic precautions for patients during their antibiotic course?		
Frequency	Percentage	Number of Respondents
Regularly	75%	20
Occasionally	25%	5

Table 4: Challenges Faced by Hospitals for Antibiotic Reactions on Patients

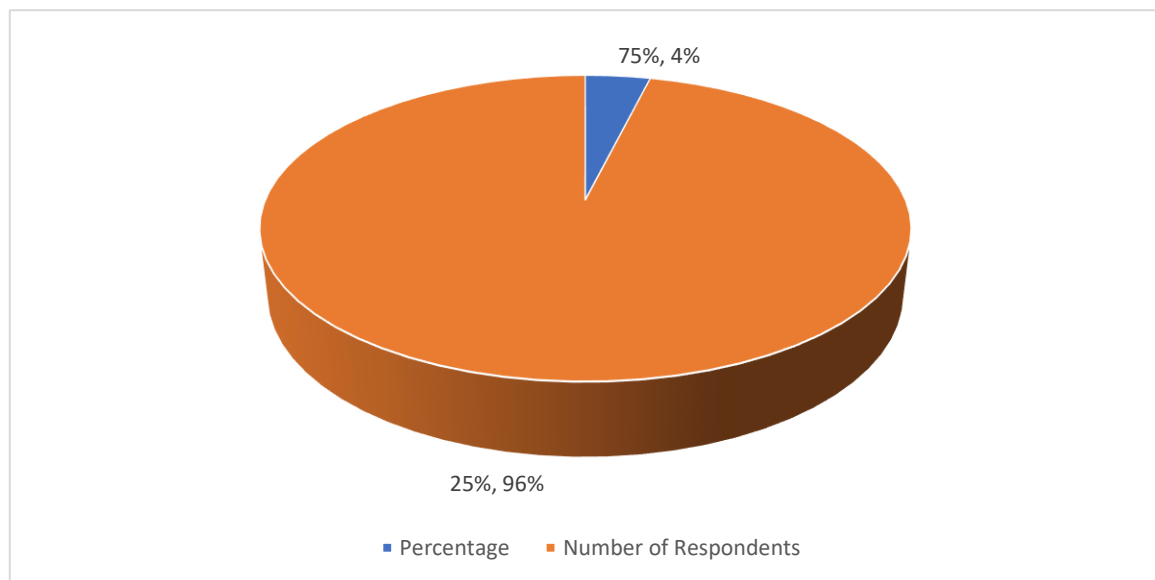


Fig 4: Graphical Representation of results

Primary Finding:: A total of 75% of respondents stated that the hospital authority is quite regular in the process of facing challenges and taking precautions as well to handle risks based on sensitivity to the issues handled within the hospital's capability.

Analysis: This result shows that authority and the integrated personnel in hospitals mostly invest proper concentration on processing all the effective issues caused by antibiotics.

5. How hospital authority can help the pharmacist to be in the stewardship initiatives in hospital management action and planning?

How hospital authority can help the pharmacist to be in the stewardship initiatives in hospital management action and planning?		
Frequency	Percentage	Number of Respondents
Regularly	80%	20
Occasionally	20%	5

Table 5: Hospital Authority's Active Status on Stewardship Initiatives for Chemists in Hospital Management.

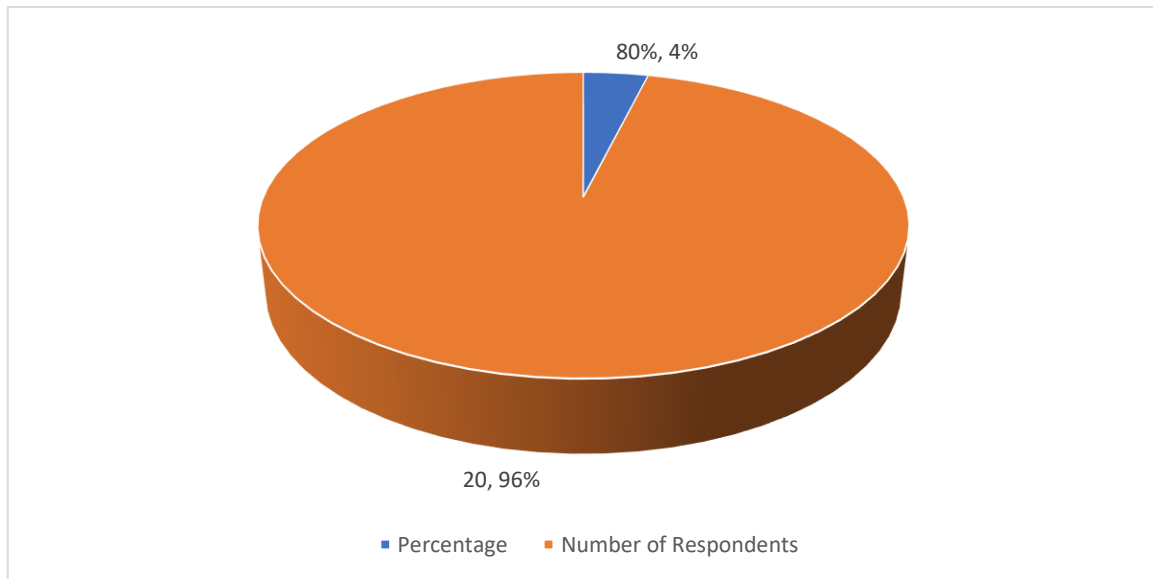


Fig 5: Graphical representation of results

Primary Finding: A total of 80% of respondents stated that the hospital authority is quite regular in the process of taking risks based on sensitivity to the issues handled within the hospital's capability.

Analysis: This result shows that authority and the integrated personnel in hospitals mostly invest proper concentration on processing all the effective issues caused by antibiotics through management actions and planning.

6. Is there any massive change in the deployment of stewardship measures during patients' antibiotic treatment procedures?

Is there any massive change in the deployment of stewardship measures during patients' antibiotic treatment procedures?		
Perception	Percentage	Number of Respondents
Highly Agree	35%	10
Agree	30%	8
Disagree	20%	4
Highly Disagree	15%	3

Table 6: Massive Change in Deployment of Stewardship Based on Antibiotic Treatment

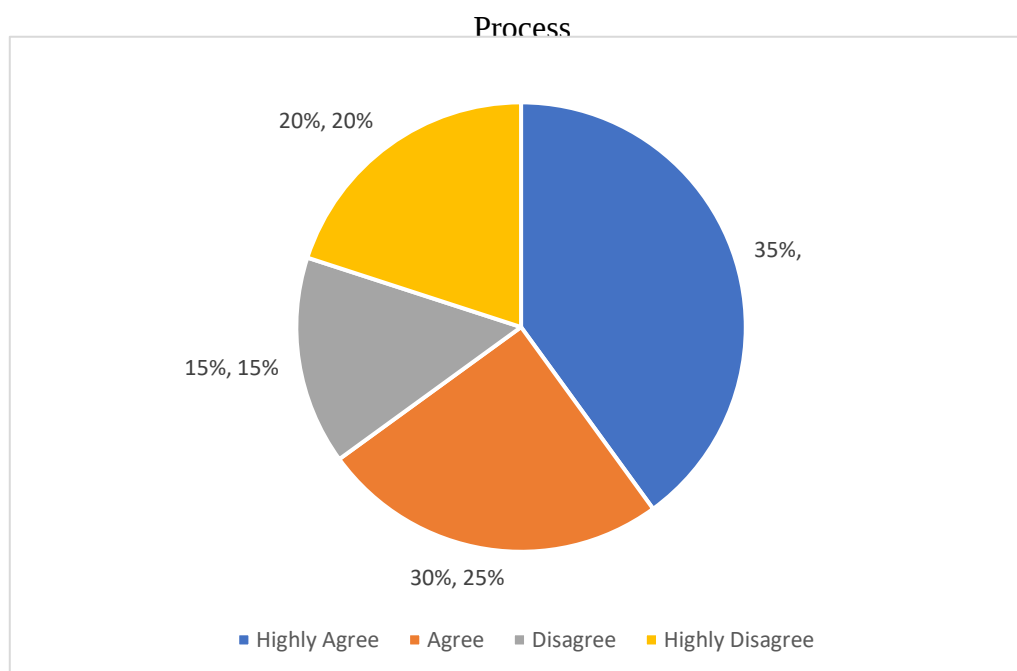


Fig 6: Graphical representation of results

Primary Finding: A total of thirty-five percent 35% of respondents highly agreed based on the following question regarding the concerned question. 30% of respondents agreed with this mentioned survey question. 20% disagreed whereas 15% highly disagreed.

Analysis: This result shows that chemists in hospitals mostly invest a great amount of their valuable time in researching and processing all the effective issues caused by antibiotic treatment procedures in this particular hospital.

7. How frequently do doctors help pharmacist in their antibiotic research efforts?

How frequently do doctors help chemists in their antibiotic research efforts?		
Frequency	Percentage	Number of Respondents
Regularly	65%	20
Occasionally	35%	5

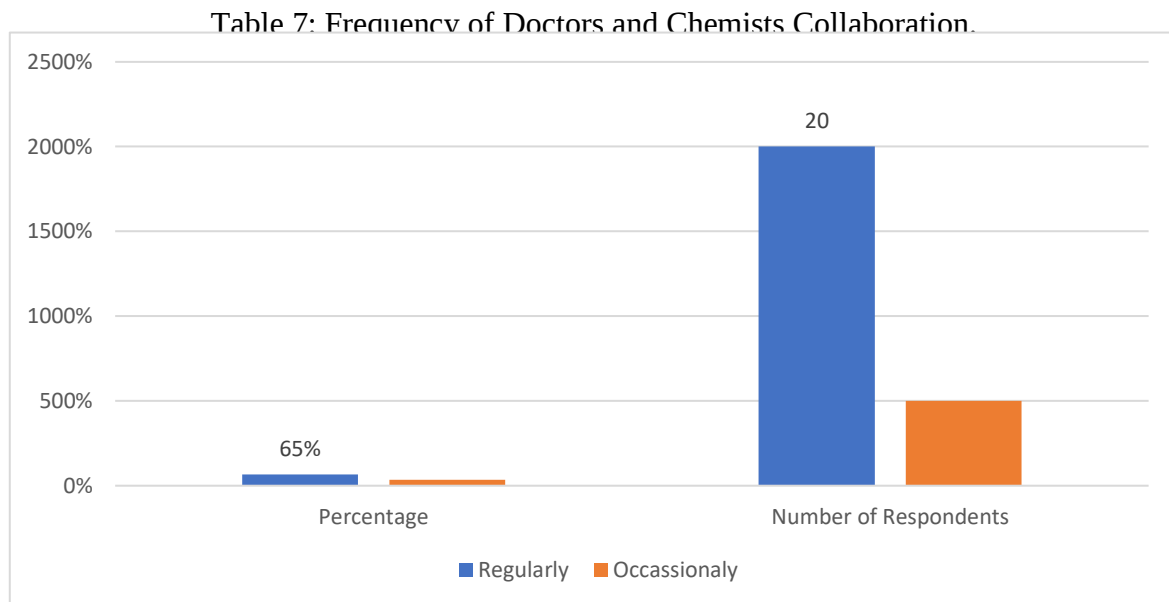


Fig 7: Graphical representation

Primary Finding:: A total of 65% of respondents stated that the hospital authority is quite regular in the process of facing challenges and taking precautions as well to handle risks based on the degree of assistance or help from doctors to their chemists as well.

Analysis: This result shows that authority and the integrated personnel in hospitals mostly invest proper concentration on processing all the effective issues caused by antibiotics.

8. Is there any doctor and hospital authority connection in planning and managing antibiotic reactions and preservations?

Is there any doctor and hospital authority connection in planning and managing antibiotic reactions and preservations?		
Perception	Percentage	Number of Respondents
Highly Agree	40%	10
Agree	25%	8
Disagree	15%	3
Highly Disagree	20%	4

Table 8: Planning and Managing for Antibiotic Reactions and Preservations

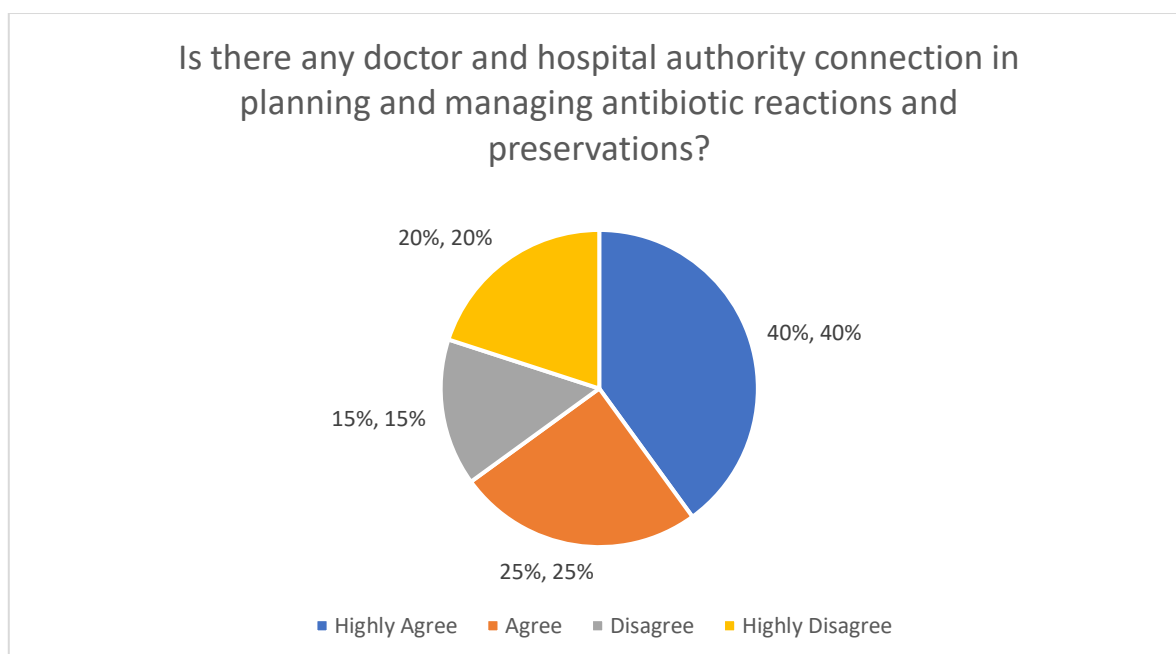


Fig 8: Graphical representation

Primary Finding: A total of forty percent 40% of respondents highly agreed based on the following question regarding the concerned question. 25% of respondents agreed with this mentioned survey question. 15% disagreed whereas 20% highly disagreed.

Analysis: This result shows that pharmacist in hospitals mostly invest a great amount of their valuable time in researching and processing all the effective issues caused by antibiotics.

9. In what ways pharmacist and doctors can participate in the entire research assessment?

In what ways pharmacist and doctors can participate in the entire research assessment?		
Strategies	Percentage	Number of Respondents
Training	48%	11
Development	32%	8
Research	20%	6

Table 9: Research Participation Done by Both Chemists and Doctors

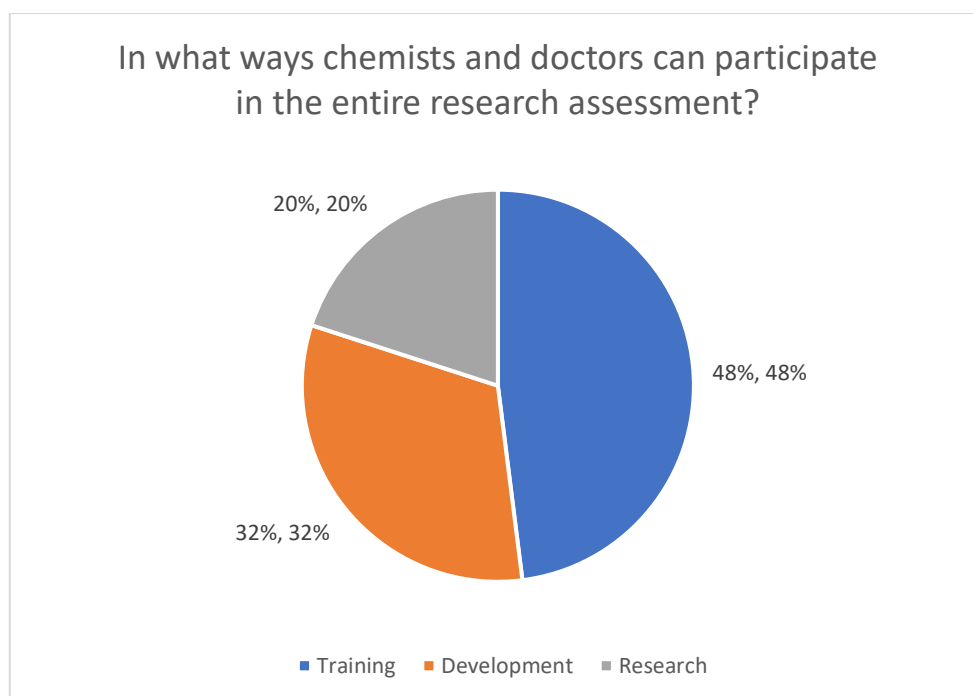


Fig 9: Graphical representation

Primary Finding: A total of forty-eight percent 48% of respondents highly agreed based on the training session on the following matter regarding the concerned question. 32% of respondents agreed with the development process mentioned in the survey question. 20% agreed on research.

Analysis: This result shows that chemists in hospitals mostly invest a great amount of their valuable time in researching and processing all the effective issues caused by antibiotics.

10. How accessibility can make integrated choices in antibiotic resistance maintenance?

How accessibility can make integrated choices in antibiotic resistance maintenance?		
Perception	Percentage	Number of Respondents
Highly Recognized	56%	14
Extremely Devalued	44%	11

Table 10: Accessibility of Integrated Choices in Antibiotic Resistance Maintenance

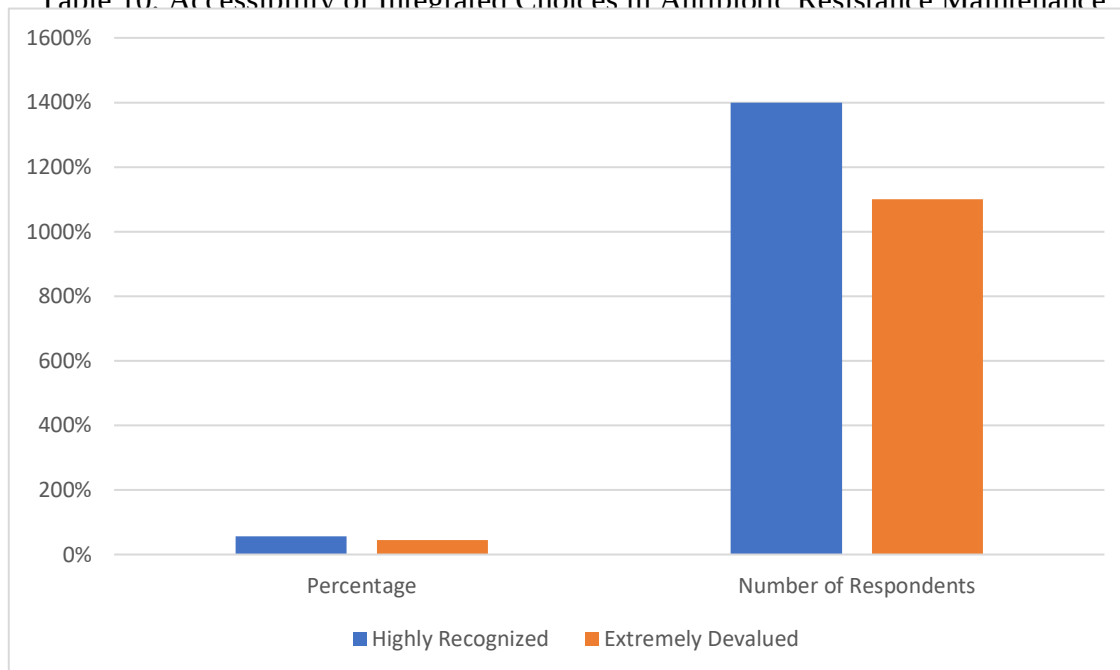


Fig 10: Graphical representation of survey results

Primary Finding: A total of 56% of respondents stated that the hospital authority is quite highly recognized in the process of taking risks based on the integrated choices to the issues handled within the hospital's capability.

Analysis: This result shows that authority and the integrated personnel in hospitals mostly invest proper concentration on processing all the effective issues caused by antibiotics.

Overall

A significant contribution that the hospital authority can make to the fight against antibiotic resistance is highlighted by the results of the survey and despite the vast number of people that are participating, there are still obstacles to overcome, such as insufficient training and a restricted amount of time that is available so it is of the utmost importance to put into action initiatives that will improve patient education, collaboration across clinical disciplines, and ongoing training and the work of the chemist should be acknowledged and valued, as this can help to ensure that efforts to reduce antibiotic resistance are maintained so is also an addition to laying the groundwork for future interventions, the current study highlights the importance of continuing research and providing support to equip chemists with the competencies necessary to effectively combat antibiotic resistance (Gilchrist et al, 2015).

Analysis of findings

1. A total of thirty-five percent 35% of respondents highly agreed based on the following question regarding the concerned question. 30% of respondents agreed with this mentioned survey question. 20% disagreed whereas 15% highly disagreed. This result shows that chemists in hospitals mostly invest a great amount of their valuable time in researching and processing all the effective issues caused by antibiotics (Gilchrist et al, 2015).

2. Also the analysis of thirty-five percent 35% of respondents highly agreed based on the following question regarding the concerned question. 30% of respondents agreed with this mentioned survey question. 20% disagreed whereas 15% highly disagreed. This result shows that chemists in hospitals mostly invest a great amount of their valuable time in researching and processing all the effective issues caused by antibiotics (Ashiru-Oredope et al, 2016).

3. There is a pattern based on the total of 80% of respondents stated that the hospital authority is quite regular in the process of taking risks based on sensitivity to the issues handled within the hospital's capability. This result shows that authority and the integrated personnel in hospitals mostly invest proper concentration on processing all the effective issues caused by antibiotics and the whole process of rectification (Ashiru-Oredope et al, 2016).

4. There are several issues in this following concept over the hospital management the pharmacists also. A total of 75% of respondents stated that the hospital authority is quite regular in the process of facing challenges and taking precautions as well to handle risks based on sensitivity to the issues handled within the hospital's capability. This result shows that authority and the integrated personnel in hospitals mostly invest proper concentration on processing all the effective issues caused by antibiotics (Ashiru-Oredope et al, 2016).

5. Assessing the degree of 80% of respondents stated that the hospital authority is quite regular in the process of taking risks based on sensitivity to the issues handled within the hospital's capability. This result shows that authority and the integrated personnel in hospitals mostly invest proper concentration on processing all the effective issues caused by antibiotics through management actions and planning.

6. A total of thirty-five percent 35% of respondents highly agreed based on the following question regarding the concerned question. 30% of respondents agreed with this mentioned

survey question. 20% disagreed whereas 15% highly disagreed. This result shows that chemists in hospitals mostly invest a great amount of their valuable time in researching and processing all the effective issues caused by antibiotic treatment procedures in this particular hospital. (Patel et al, 2016).

7. This result shows that authority and the integrated personnel in hospitals mostly invest proper concentration on processing all the effective issues caused by antibiotics. A total of 65% of respondents stated that the hospital authority is quite regular in the process of facing challenges and taking precautions as well to handle risks based on the degree of assistance or help from doctors to their chemists as well.

8. A total of forty percent 40% of respondents highly agreed based on the following question regarding the concerned question. 25% of respondents agreed with this mentioned survey question. 15% disagreed whereas 20% highly disagreed. This result shows that chemists in hospitals mostly invest a great amount of their valuable time in researching and processing all the effective issues caused by antibiotics (Dyar et al, 2017).

9. Strategies that are based on the total of forty-eight percent 48% of respondents highly agreed based on the training session on the following matter regarding the concerned question. 32% of respondents agreed with the development process mentioned in the survey question. 20% agreed on research. This result shows that chemists in hospitals mostly invest a great amount of their valuable time in researching and processing all the effective issues caused by antibiotics. (Dyar et al, 2017).

10. The perception of recognition and the overall results on this particular statement show that A total of 56% of respondents stated that the hospital authority is quite highly recognized in the process of taking risks based on the integrated choices to the issues handled within the hospital's capability. This result shows that authority and the integrated personnel in hospitals mostly invest proper concentration on processing all the effective issues caused by antibiotics.

To maximize the effectiveness of the chemist's involvement in the fight against antibiotic resistance, it is very necessary to place a high priority on collaboration, ongoing education, and increasing recognition and these discoveries produce important knowledge that can be put to use in the development of treatments and policies that are targeted at boosting the impact that chemists have on the health of people all around the world. Overall the results of

the survey indicate that chemists are actively engaged in the fight against antibiotic resistance in a constructive manner and the fact that there are time limits and insufficient training, on the other hand, highlights the necessity of continuous reinforcement and advancement.

Future prospects of this study

I would want to reflect on the application of knowledge to improve antibiotic resistance management because there have been significant discoveries made as a result of the investigation into the role that chemists play in combating antibiotic resistance and these discoveries have the potential to pave the way for specific advancements in medical procedures because it is clear from these data that chemists play a significant part in the management of antibiotic stewardship and resistance and in this area, we will present a brief summary of the most important insights that were gathered, as well as prospective actions that could be taken in the future(Baur et al, 2017).

Innovations of a significant nature that are necessary:

1. A number of chemists have voiced their discontent with their training, and there are a variety of perspectives regarding the recognition of their role in the management of antibiotic resistance.
2. "Customised Patient Education" can provide patient education sessions that are suited to the particular needs of the patient, taking into consideration issues such as the patient's level of resistance, language obstacles, and time limits and providing patients with materials that are clear and concise will further improve their comprehension.
3. A considerable number of pharmacists are actively involved in stewardship initiatives, evaluate antibiotic prescriptions, and work together with other healthcare professionals and this is referred to as "active involvement of pharmacists."
4. Technical advancements are needed to aid patient learning since the following are some of the challenges that are experienced in the process of patient education: time constraints, difficulties in understanding, and the occasional unwillingness of patients are some of the hurdles that are met.
5. Positive Impact of Stewardship initiatives is necessary as pharmacists who actively participate in antimicrobial stewardship initiatives observe benefits, such as

considerable reductions in antibiotic resistance rates and also stewardship projects have several positive impacts.

6. Sustained Training Programmes are continuous training programs as a means of addressing identified knowledge deficits and ensuring that chemists keep up-to-date on developments in antibiotic stewardship.
7. Recognition initiatives that honor the essential role that chemists play in combatting antibiotic resistance should be introduced as the goal of these efforts is to improve morale and job satisfaction among employees.
8. Establishing feedback systems can help in gathering the perspectives of chemists and supporting the ongoing improvement of strategies and treatments (Drekonja et al, 2017).
9. Public Awareness campaigns can help collaborate with chemists to design and implement initiatives targeted at educating the general public about the prudent use of antibiotics.

Interdisciplinary Collaboration can provide a complete approach to combating antibiotic resistance, it is essential to improve the platforms for interdisciplinary collaboration among healthcare experts and this is because antibiotic resistance is a phenomenon that has become increasingly difficult to treat.

In general, we will be able to contribute to the overarching objective of ensuring that antibiotics continue to be effective for future generations and hence the establishment of a foundation for ongoing progress, the survey ensures that chemists will continue to be at the forefront of efforts to combat antibiotic resistance (Jamshed et al, 2018). Regarding the fight against antibiotic resistance, the findings shed light on the reciprocal roles that opportunity and challenge play in the fight and it is possible to contribute to the establishment of a workforce of chemists that is more skilled and efficient by addressing concerns relating to patient education, inadequate training, and acknowledgment so this vital area of global health has the potential to make further advancements in the future, as demonstrated by the good impacts that stewardship programs have had and in the future, it will be necessary for chemists, legislators, and healthcare groups to work together so through the implementation of specific tactics that are based on these findings, we have the potential to enhance the role that chemists play in the fight against antibiotic resistance.

Conclusion

This study has clarified the vital role that hospitals, authorities, doctors, and pharmacists play in the critical fight against antibiotic resistance. The study has had admirable involvement and recognition of difficulties in the poll results, which have shown nuanced and complicated viewpoints and targeted interventions can be developed to improve interdisciplinary collaboration, continuing training, and patient education by using these observations that is why, by addressing these issues, we can enable chemists to make a lasting difference in healthcare systems around the world and to aid in the fight against antibiotic resistance and this paper highlights the significance of continuously supporting, educating, and recognising chemists so they can play a more active part in the complex fight against antibiotic resistance.

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