



شبكة المعلومات الجامعية  
التوثيق الإلكتروني والميكرو فيلم

# بسم الله الرحمن الرحيم



**HANAA ALY**



شبكة المعلومات الجامعية  
التوثيق الإلكتروني والميكروفيلم



# شبكة المعلومات الجامعية التوثيق الإلكتروني والميكروفيلم



**HANAA ALY**



شبكة المعلومات الجامعية  
التوثيق الإلكتروني والميكروفيلم

# جامعة عين شمس

## التوثيق الإلكتروني والميكروفيلم

### قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها  
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات



### يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار



**HANAA ALY**

**PATTERNS OF ANTIMOCROBIAL USE AND  
ITS RESISTANCE PREVALENCE**  
(STUDY AT AIN SHAMS UNIVERSITY SPECIALIZED HOSPITAL  
"ASUSH")

**Submitted By**  
**Nourhan Hussein Abdo Ali**

B. Sc. of Pharmaceutical Science, Faculty of Pharmacy, Cairo University,  
2013

A Thesis Submitted in Partial Fulfillment  
Of  
The Requirement for the Master Degree  
In  
Environmental Sciences

Department of Environmental Medical Sciences  
Institute of Environmental Studies and Research  
Ain Shams University

**2021**

APPROVAL SHEET  
**PATTERNS OF ANTIMICROBIAL USE AND ITS  
RESISTANCE PREVALENCE**  
(STUDY AT AIN SHAMS UNIVERSITY SPECIALIZED HOSPITAL  
"ASUSH")

**Submitted By**  
**Nourhan Hussein Abdo Ali**

B. Sc. of Pharmaceutical Science, Faculty of Pharmacy, Cairo University, 2013

A Thesis Submitted in Partial Fulfillment

Of

The Requirement for the Master Degree

In

Environmental Sciences

Department of Environmental Medical Sciences

**This thesis was discussed and approved by:**

Name

Signature

**1-Prof. Dr. Lamia Fouad Fathy Abdel Megid**

Prof. of Medical Microbiology and Immunology

Faculty of Medicine Ain Shams University

**2-Prof. Dr. Wafaa Khalil Zaki**

Prof. of Medical Microbiology and Immunology

Faculty of Medicine Ain Shams University

**3-Prof. Dr. Eman Mohamed Amin**

Prof. of Microbiology Faculty of Science

Ain Shams University

Consultant of Microbiology, Ain Shams Specialized Hospital

**2021**

**PATTERNS OF ANTIMOCROBIAL USE AND ITS  
RESISTANCE PREVALENCE**  
(STUDY AT AIN SHAMS UNIVERSITY SPECIALIZED HOSPITAL  
"ASUSH")

**Submitted By**  
**Nourhan Hussein Abdo Ali**

B. Sc. of Pharmaceutical Science, Faculty of Pharmacy, Cairo University,  
2013

A Thesis Submitted in Partial Fulfillment  
Of  
The Requirement for the Master Degree  
In  
Environmental Sciences  
Department of Environmental Medical Sciences

Under The Supervision of:

**1-Prof. Dr. Wafaa Khalil Zaki**

Prof. of Medical Microbiology and Immunology  
Faculty of Medicine  
Ain Shams University

**2-Prof. Dr. Gehan Mohamed Fahmy**

Prof. of Clinical Microbiology  
Infection Control Consultant  
Ain Shams Specialized Hospital

**2021**

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قالوا

سببناك لا علم لنا  
إلا ما علمتنا إنك أنت  
العليم العظيم

صدقة الله العظيم

سورة البقرة الآية: ٣٢



## ACKNOWLEDGEMENT

First and foremost, praise is to *Allah* to whom I relate any success in my life.

I would like to express my deepest thanks to *Prof. Dr. Wafaa Khalil Zaki* for her guidance, great support and constant advice. It was a real privilege and honor for me to work under her supervision.

I owe special thanks, gratitude and appreciation to *Prof. Dr. Gehan Mohamed Fahmy* for her close supervision, continuous advice which gave me the best guidance during all stages of this work.

Finally, I must express my very profound gratitude to *my parents and my husband* for providing me with unfailing support and continuous encouragement throughout this researching and writing journey.

*Nourhan Hussein abdo ali*



# Abstract

**Introduction:** Antibiotics are prescribed for treating bacterial infections. However, Excessive use of antibiotics leads to the development and spread of multidrug resistant bacteria, currently regarded as a global public health crisis threatening our ability to treat common infectious diseases.

**Aim of the work:** To analyze the use and prescribing patterns of antimicrobials by physicians at Ain-Shams University Specialized Hospital (ASUSH) for inpatients among different infections and to determine the prevalence of different types of bacterial resistance.

**Subjects and methods:** A cross- sectional study was conducted at (ASUSH). A total of 339 microorganisms isolated from several samples types were identified and studied using VITEK® 2 system. Physicians' attitudes and knowledge were assessed using a questionnaire about antibiotic resistance problem.

**Results:** Among (339) bacterial isolates *Klebsiella pneumoniae* was the most common isolate n=92 (27.1%), followed by *E-coli* n=60 (17.7%), *Staph coag -ve (SCONs)* n= 43 (12.7%) and *Methecillin resistant staphylococcus aureas (MRSA)*, *Pseudomonas aeruginosa* and *Acinetobacter baumannii* n=33 (9.7%) for each. In this study, the majority of physicians had good knowledge about the antibiotic resistance meaning and the magnitude of that problem.

**Conclusion:** Strategies for control of resistant bacteria should consider variations among sample types, wards, and antibiotic resistance variability. There is a need to specifically address staff training and communication procedures for infection prevention and control with respect to drug resistant bacteria.

## LIST OF CONTENTS

| Title                                                                      | Page |
|----------------------------------------------------------------------------|------|
| List of abbreviations                                                      | I    |
| List of figures                                                            | III  |
| List of tables                                                             | VI   |
| Introduction                                                               | 1    |
| Aim of the study                                                           | 4    |
| Review of literature                                                       | ٦    |
| • Chapter (1): Antibiotic resistance                                       | ٧    |
| • Chapter (2): Scope of the antibiotic resistance problem                  | ١١   |
| • Chapter (3): Risk factors for hospital acquired MDR bacterial infections | 1٥   |
| • Chapter (4): Priority Pathogens                                          | ٢٠   |
| methods                                                                    | 2٩   |
| Results                                                                    | 3٣   |
| Discussion                                                                 | 5٢   |

| <b>Title</b>                    | <b>Page</b>          |
|---------------------------------|----------------------|
| <b>Summary &amp; Conclusion</b> | <b>5<sup>^</sup></b> |
| <b>Recommendation</b>           | <b>61</b>            |
| <b>References</b>               | <b>63</b>            |
| <b>Appendices</b>               | <b>74</b>            |
| <b>Arabic summary</b>           | <b>1-4</b>           |

## LIST OF FIGURES

| Figure No  | Title                                                             | Page No |
|------------|-------------------------------------------------------------------|---------|
| Figure (1) | morphology of <i>Acinetobacter</i>                                | 23      |
| Figure (2) | the gram stain morphology of <i>E. coli</i>                       | 24      |
| Figure (3) | the gram stain morphology of <i>Klebsiella pneumoniae</i>         | 25      |
| Figure (4) | morphology of <i>Pseudomonas aeruginosa</i>                       | 27      |
| Figure (5) | the gram stain morphology of <i>Staphylococcus aureus</i>         | 28      |
| Figure (6) | distribution of the sample population according to the age        | 34      |
| Figure (7) | distribution of multidrug resistant pathogens in studied patients | 35      |
| Figure (8) | incidence of MDR, XDR and PDR strains of each pathogen            | 38      |
| Figure (9) | Sensitivity of <i>Acinetobacter</i>                               | 38      |

| Figure No   | Title                                                                                | Page No |
|-------------|--------------------------------------------------------------------------------------|---------|
|             | <i>baumanni</i> to commonly used antibiotics                                         |         |
| Figure (10) | Sensitivity of <i>E. coli</i> to commonly used antibiotics                           | 39      |
| Figure (11) | Sensitivity of <i>Klebsiella pneumoniae</i> to commonly used antibiotics             | 39      |
| Figure (12) | sensitivity of <i>MRSA</i> to commonly used antibiotics                              | 40      |
| Figure (13) | sensitivity of <i>Pseudomonas aeruginosa</i> to commonly used antibiotics            | 40      |
| Figure (14) | sensitivity of <i>staph coag -ve</i> to commonly used antibiotics                    | 41      |
| Figure (15) | distribution of multi drug resistant bacteria according to season (summer or winter) | 42      |
| Figure (16) | factors lead to antibiotic resistance                                                | 45      |
| Figure (17) | antibiotics more borne to induce                                                     | 46      |

| <b>Figure No</b>   | <b>Title</b>                                                            | <b>Page No</b> |
|--------------------|-------------------------------------------------------------------------|----------------|
|                    | <b>resistance</b>                                                       |                |
| <b>Figure (18)</b> | <b>complications related to antibiotic resistance</b>                   | 46             |
| <b>Figure (19)</b> | <b>factors can prevent or contain antibiotic resistance</b>             | 47             |
| <b>Figure (20)</b> | <b>antibiotics which should be added to hospital's restriction list</b> | 48             |
| <b>Figure (21)</b> | <b>The current level of restriction</b>                                 | 48             |
| <b>Figure (22)</b> | <b>choice of empiric antibiotic</b>                                     | 50             |
| <b>Figure (23)</b> | <b>How they get information about infection management</b>              | 51             |

## LIST OF TABLES

| <b>Table<br/>No</b>  | <b>Title</b>                                                                                       | <b>Page<br/>No</b> |
|----------------------|----------------------------------------------------------------------------------------------------|--------------------|
| <b>Table<br/>(1)</b> | <b>Distribution of patients according to<br/>gender</b>                                            | <b>34</b>          |
| <b>Table<br/>(2)</b> | <b>Distribution of patients according to<br/>age</b>                                               | <b>34</b>          |
| <b>Table<br/>(3)</b> | <b>distribution of multidrug resistant<br/>pathogens in studied patients</b>                       | <b>35</b>          |
| <b>Table<br/>(4)</b> | <b>distribution of isolated pathogens<br/>from each sample</b>                                     | <b>36</b>          |
| <b>Table<br/>(5)</b> | <b>incidence of MDR, XDR and PDR<br/>strains of each pathogen</b>                                  | <b>37</b>          |
| <b>Table<br/>(6)</b> | <b>distribution of multidrug resistant<br/>bacteria according to season<br/>(summer or winter)</b> | <b>41</b>          |
| <b>Table<br/>(7)</b> | <b>Relation between department and<br/>sensitivity to antibiotics</b>                              | <b>43</b>          |
| <b>Table<br/>(8)</b> | <b>Demographic data of the sample</b>                                                              | <b>44</b>          |