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IMPACT ON USE OF ANTIMICROBIAL PRESCRIBING ORDER FORM IN ICU DAILY PRACTICE IN ADJUSTMENT OF ANTIMICROBIAL PRESCRIBING AND IN ENHANCEMENT OF PATIENTS CLINICAL OUTCOMES

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ABSTRACT

The aim of all workers in the medical field is saving the patients' lives wherefore; most of physicians when their patients get infections, they start broad spectrum antibiotic immediately to save them from death by infection and sepsis. The overuse of broad spectrum antibiotics induces new strains of microorganisms which make antibiotic resistance nowadays. In present study, we investigated the impact of use antimicrobial prescribing form to help us in adjustment of antibiotic prescribing manner and to enhance patients' clinical outcomes. The study was implemented in adult ICU which has medical and surgical beds in general hospital. It is retrospective study which compared the results of using this form within two years after January 2014 with the results of not using this form within two years before January 2014. The results indicated that there was a significant adjustment in antibiotic consumptions between different antibiotic molecules and a significant enhancement in patients' clinical outcomes like mortality, ICU stay infection time and a non-significant decreasing in cost.

KEYWORDS: antimicrobial prescribing form, icu, antibiotics consumption, antibiotic resistance, antibiotic overuse.

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INTRODUCTION

Overuse and misuse of antimicrobial agents has been described worldwide in both community [1, 2] and hospital [3, 4] settings. Adequate antibiotic use is one of the main targets of the medical community [5]. As well as the effect on patients [6, 7], antibiotic misuse can stimulate the emergence of bacterial resistance [4, 8] and increase health care costs [9]. It has been noticed that the infectious disease physicians play a very important role in managing antibiotic use in the hospital [10], as does a multidisciplinary team approach, with the active involvement of clinical microbiologists and clinical pharmacists [8, 9, 11-13]. It is evident that optimizing antibiotic use is a challenge that deserves to be undertaken. Antibiotics account for about one-third of a hospital's pharmacy budget. Between 25% and 50% of hospitalized patients receive antibiotics but surveys suggest that 22–65% of prescriptions are either inappropriate or incorrect. [13-19] Antibiotic resistance within hospitals is becoming an increasingly important problem worldwide. Many studies had been done to optimize the antibiotic use and increase its efficacy by adjusting its use [20-22]. The antibiotic order form will be useful for surveillance, if logistic support is provided by the pharmacy. The combination of several measures leads to improved quality of use. As correctly predicted by the first evaluation, improvement in quality resulted in increased drug consumption by fewer patients and a higher cost per bed day [20] Implementation and use of the form was very positive [21]. A specialized antibiotic order form is an effective method for antibiotic utilization review and can have a significant impact on a physician's prescribing patterns [22].

MATERIAL AND METHODS

It is a retrospective study throughout four years; the aim of study is to investigate the impact of using antimicrobial prescribing order to enhance antibiotic utilization and cost and to improve patients' clinical outcomes in ICU daily practice. The study was conducted in adult ICU which consists of surgical and medical beds in 1000 beds general hospital. 2440 patients' data were scrutinized in study throughout four years, 1342 patients were after January 2014 and 1098 patients were before January 2014, almost 1262patients were fitted to inclusion criteria which are shown below.

Inclusion criteria include that:

1. Patients who were admitted in ICU
2. Patients who had antimicrobial request which was written by in-charge medical professionals with 48 hours from starting antibiotic.

From January 2014, we implemented antimicrobial prescribing model in the daily practice in our ICU. This antimicrobial request which is shown in appendix (1) was designed by our clinical pharmacist and it took approval from our hospital antibiotic committee within ethics' code of Minia university to be used mainly in ICU setting in which a lot of antibiotics were been used. This request included all things about antimicrobial agents, pathogen, site of sample collection, and site of infection, patient demographic data, and type of therapy, duration of therapy and cause of starting this antimicrobial agent. This request was requested by treating clinicians and it was reviewed and it was audited by ID clinical pharmacist who is one of authors in this study, the revision covered the area belong to adherence of therapy to ICU guidelines and its justification. The request was filled with any antimicrobial agent starting at any time even night, it was filled by nursing staff and it was stamped by treating clinician and it was reviewed by ID clinical pharmacist within 24 hours from starting it, if any difference between the prescribing and local antibiotic guidelines, the intervention would been happened between ID clinical pharmacist and treating clinicians to adhere prescribing to local protocol.

RESULTS AND DISCUSSION

All results were been collected and analyzed by SPSS version 20. The demographic results show a non-significant difference between all patients who participated in study per years of study; no differences were founded in age, gender, authenticity, BMI and comorbidities between patients through four years of study, shown in table (1).The study results show significant improvement in different aspects like mortality, ICU stay, cost related to infection, total hospital cost and Sequential Organ Failure Assessment Score SOFA Score, whereas; a significant decrease in mortality, ICU stay and SOFA score was found at 2014,2015 with P value (0.03, 0.045, 0.039) respectively. A non-significant decrease in cost related to infection and total hospital cost at 2014, 2015 was found with p value (0.5, 0.6) respectively, shown in table (2) and figures (1-5). These results were strongly agreed with the results which were stated by Gyssens, I.C. et al [20] who announced that the antibiotic order form will be useful for surveillance for antibiotics use. Similarly, the results were agreed with Robert J. Lipsy et al [21] who stated that experience with implementation and use of the form was very positive. Significant difficulties with compliance were not encountered. Benefits of the form included reductions in the duration of surgical prophylaxis and in the frequency of inappropriate dosing intervals. The present study results also show that a significant improvement in antibiotic utilization between antibiotic groups, whereas; the antibiotic groups were used with almost equal quantities at 2014, 2015, shown in table (3) and figure (6), these results came with agreement with the results which were shown by Roger M et al [22] who conclude that a specialized antibiotic order form is an effective method for antibiotic utilization review and can have a significant impact on a physician's prescribing patterns. The results show a significant adherence to antimicrobial request order by physicians and pharmacist at 2014, 2015, shown in figure (7).

Request for Antimicrobial Drug

A. *Request Details :*

Date of requisition: - ...../...../200 Time of requisition: - ...../..... AM /PM
Department of requisition : - ..... ward no: - .....
Patient hospital no: - ..... Room: ..... Bed: - .....

B. *Patient Information :*

Patient Name: - ..... Age: -..... sex: - M / F
Nationality: ..... Civil ID No: - .....
Weight: ..... kg Height:-.....cm
Admitted From where: ..... Date of Admission: - .....
Diagnosis: - .....

C. *Requested Antimicrobial Details :-*

Generic Name: ..... Trade Name: - .....
Dosage Form: - ..... Strength: - .....
Required Dose: -.....
Total Quantity Required from This Drug: - .....

D. *Medical Report of The Patient & Reasons for Requesting This Antimicrobial :-*

- Type of treatment :- □ prophylaxis □ documented (culture based) □ empirical □ pre-emptive
- For empirical therapy, what the expected pathogen .....
- For documented therapy and what the pathogen and antibiotic sensitivity.....

microorganism	Site of infection	Antimicrobial sensitive	comment

- Any further event.....
.....

Reporter Details
Consultant Name: - .....
Sig / Stamp .....

ID Clinical Pharmacist in Charge
Name: - .....
Sig / Stamp.....

Auditing For Antibiotic Policy Compliance:-

- ***RECOMMENDED ANTIBIOTIC ACCORDING TO POLICY: - .....***
- ***IMPRESSION :-***

□ COMPLAINT □ NON-COMPLAINT WITH JUSTIFICATION □ NON-COMPLAINT WITHOUT JUSTIFICATION

- ***ACTION:-***
.....
.....

c.c.:- 1- Head of The Requested Department
2- Head of the ID Clinical Pharmacy Department Page 1

Appendix 1
Antimicrobial Request Form

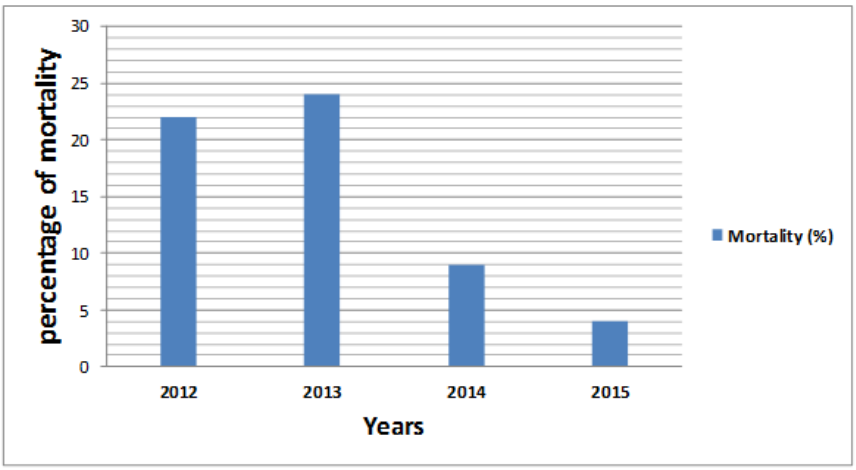


Figure 1
percentage of mortality

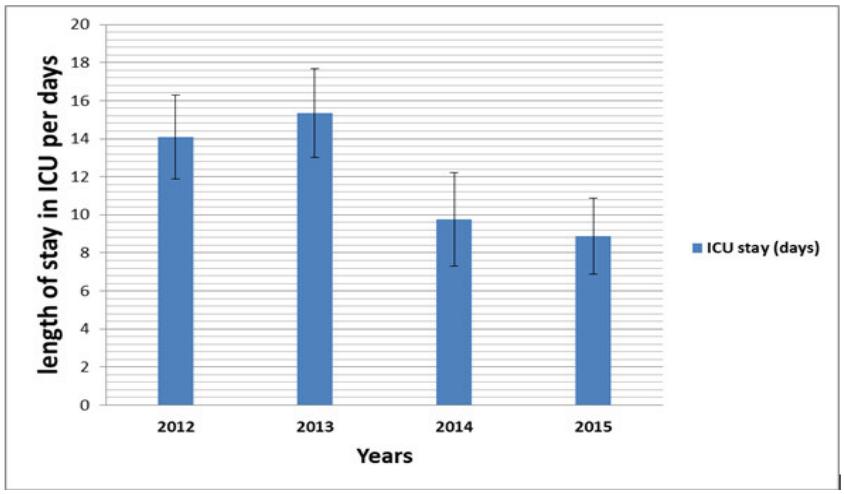


Figure 2
length of stay in ICU per days

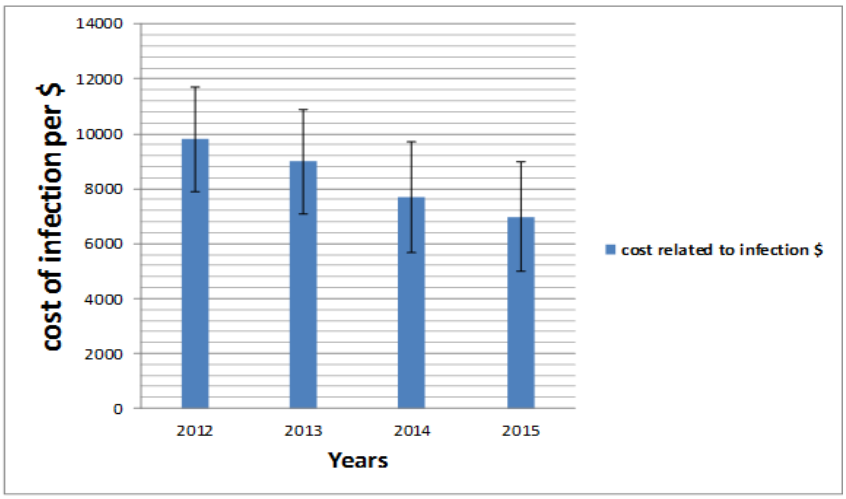


Figure 3
cost per American dollar caused by infection

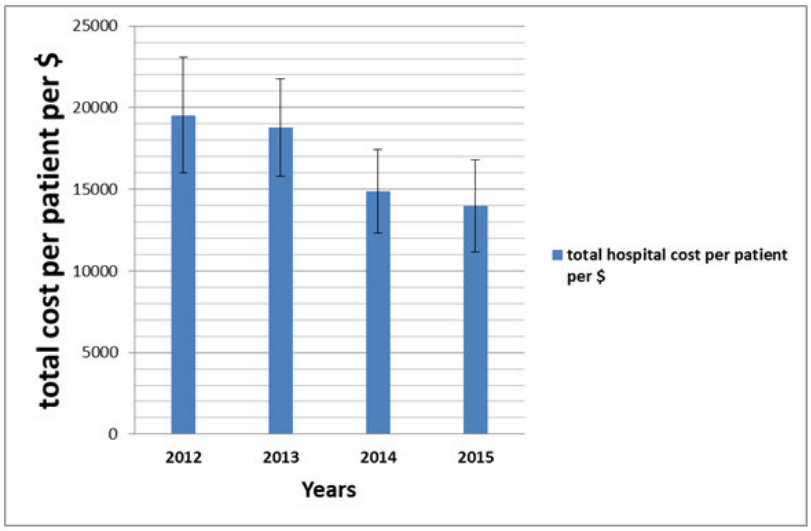


Figure 4
Total hospital cost per american dollar

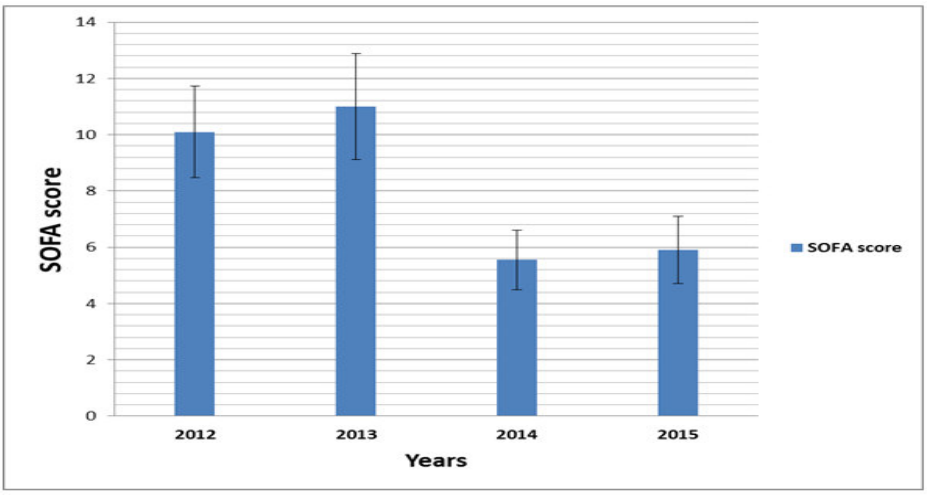
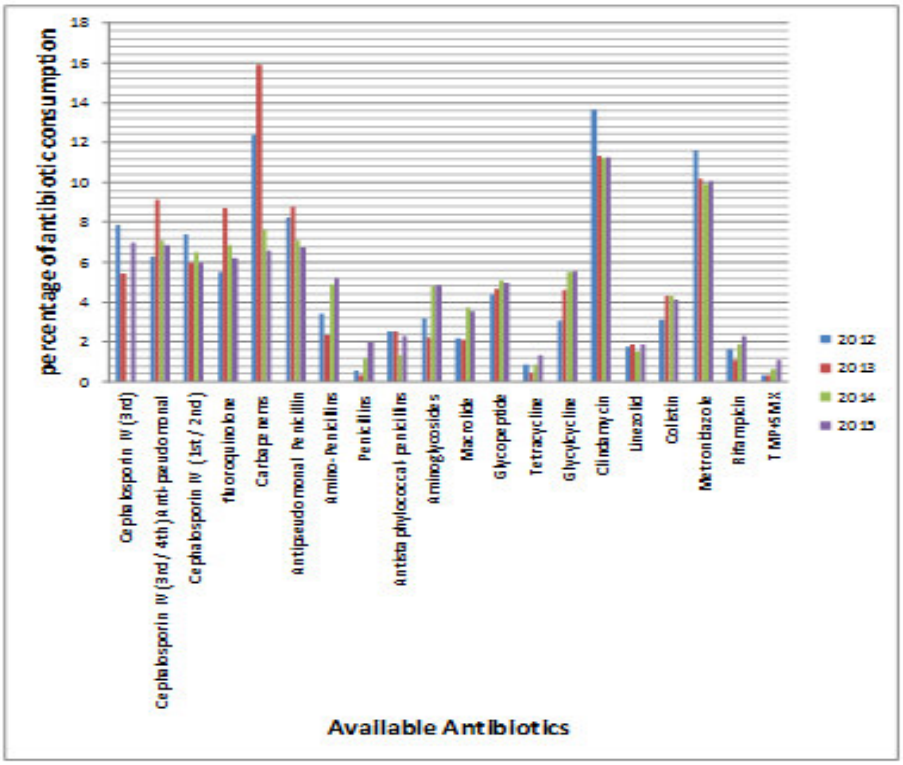


Figure 5
SOFA score for study patients



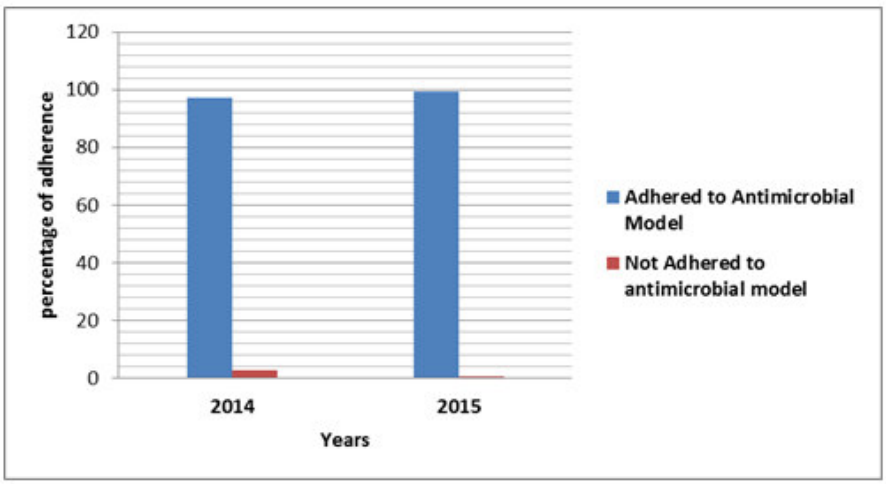


Figure 6
percentage of antibiotic consumption per years of study

Table 1
Demographic data

Demographic data	*2012*	*2013*	*2014*	*2015*	*P-VALUE*
Age (year)	51±11.4	55±12	56±14.2	53±11	0.76
Gender (female) %	204 (56)	168 (49)	256 (55)	280 (52)	0.79
Authenticity					
Arabic %	215 (59)	211 (62)	316 (68)	338 (63)	0.77
Asian %	124 (34)	112 (33)	130 (28)	166 (31)	0.75
Other %	26 (7)	18 (5)	19 (4)	33 (6)	0.9
BMI	25±3	28.5±2.9	23±2.5	27±2.33	0.66
Comorbidities					
Respiratory	240 (66)	218 (64)	274 (59)	332 (62)	0.70
Cardiovascular %	91 (25)	109 (32)	125 (27)	161 (30)	0.69
Immunodeficiency %	40 (11)	30 (9)	37 (8)	64 (12)	0.70
CNS %	44 (12)	45 (13)	74 (16)	80 (15)	0.79
Oncology %	15 (4)	10 (3)	23 (5)	21 (4)	0.65
Hematology %	47 (13)	55 (16)	70(15)	91 (17)	0.77
Liver %	55 (15)	64 (19)	84 (18)	107 (20)	0.43
Renal %	157 (43)	167 (49)	204 (44)	252 (47)	0.9

***Data are presented as mean ± SD or No. (%).*Significant difference = p≤ 0.05**
***n value (2012) = 365*n value (2013) = 341*n value (2014) = 465*n value (2015) = 537**

Table 2
clinical outcomes results

Outcome Data	2012	2013	2014	2015	P-VALUE
Mortality (%) Because of sepsis	80(22)	83(24)	41(9)	23(4)	0.03
ICU stay (days)	14.1±2.21	15.34±2.33	9.76±2.45	8.89±1.99	0.045
Cost related to infection ($)	9800±1890	9001±1901	7685±2011	6987±1983	0.5
Total hospital cost ($)	19543±3546	18765±2978	14873±2542	13982±2804	0.6
SOFA SCORE	10.1±1.62	11±1.89	5.55±1.05	5.9±1.2	0.039

***Data are presented as mean ± SD or No. (%).*Significant difference = p≤ 0.05**
***n value (2012) = 365*n value (2013) = 341*n value (2014) = 465*n value (2015) = 537**

Table 3
percentage of antibiotic consumption per years of study

	2012	2013	2014	2015	P value
Cephalosporin IV (3^{rd})	7.89	5.43	7,99	6.99	0.053
Cephalosporin IV (3^{rd} / 4^{th}) Anti-pseudomonal	6.3	9.12	7.12	6.87	0.052
Cephalosporin IV (1^{st} / 2^{nd})	7.43	5.98	6.54	5.98	0.055
fluoroquinolone	5.51	8.7	6.899	6.21	0.053
Carbapenems	12.4	15.89	7.67	6.55	0.043
Antipseudomonal Penicillin	8.21	8.76	7.12	6.76	0.051
Amino-Penicillins	3.45	2.34	4.89	5.21	0.049
Penicillins	.54	.33	1.14	1.98	0.048
Antistaphylococcal-penicillins	2.54	2.54	1.32	2.32	0.052
Aminoglycosides	3.2	2.21	4.76	4.87	0.0495
Macrolide	2.145	2.1	3.7	3.54	0.0511
Glycopeptide	4.395	4.65	5.11	4.99	0.054
Tetracycline	.87	.44	.89	1.32	0.051
Glycylcycline	3.05	4.6	5.5	5.54	0.0522
Clindamycin	13.62	11.32	11.21	11.26	0.059
Linezolid	1.76	1.89	1.54	1.89	0.06
Colistin	3.1	4.316	4.32	4.11	0.063
Metronidazole	11.6	10.21	9.9	10.11	0.059
Rifampicin	1.65	1.12	1.87	2.3	0.055
TMP+SMX	.33	.34	.65	1.12	0.052

***data are presented as percentage (%) from total percentage of year consumption (100%)**
***significant difference = p≤ 0, 05**

CONCLUSION AND RECOMMENDATION

According to our study results which were significantly good, it is recommended that all hospitals have to use its designated antimicrobial order to adjust antibiotics use and to improve patients' clinical outcomes and to save patients' lives. And we also recommend using such previous forms in hospital computer system to facilitate and to accelerate the using process.

CONFLICT OF INTEREST

Conflict of interest declared none.

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