A SCIENTIFIC PAPER TITLED: EVALUATING THE ANTIBIOTICS' USE ON PATIENTS WITH CHRONIC KIDNEY FAILURE IN AL IMAN GENERAL HOSPITAL, RIYADH, SAUDI ARABIA

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Abstract

Background: Antibiotics are one of the most widely utilized classes of medications for the treatment of infectious disorders. The application of antibiotics and can be seen as one of the most important things that hospitals accomplish since it contributes to maintaining a consistent level of living for a significant number of individuals.

Aim of work: The purpose of this study was to investigate the appropriateness of the antibiotics.

Patients and Methodology: About 48 cases who were being administered at the Al-Iman General Hospital located in Al-Riyadh, Saudi Arabia. This hospital treats a significant number of patients who suffer from chronic renal failure as well as a variety of infections. This study looked at a large number of cases to ensure that the evaluation included the appropriate indication, patient, medicine, and dose for each circumstance. This study looked backward at the medical records of people who had chronic renal failure and had been admitted to the hospital as inpatients.

Results: The findings of the search and the evaluation revealed that the appropriate antibiotics were administered in as many as 32 of the cases (66.6%), that patients with chronic renal failure who met the appropriate criteria were present in 46 of the cases (95.8%), that the appropriate class of antibiotics was administered in 19 of the cases (34.7%), and that the appropriate dosage of antibiotics was administered in 18 of the cases (51.7%). All cases were discharged with a good and perfect health status.

Conclusion: Using improper or prolonged usage of antibiotics is so dangerous in general and for patients with chronic kidney diseases specifically, so**,** antibiotics have the potential to produce nephrotoxicity in the kidneys, a person who has chronic renal failure should carefully consider whether or not they should take them.

Keywords: Al Iman general Hospital- antibiotics' use – chronic renal failure – Riyadh – Saudi Arabia.

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DOI: 10.53555/ecb/2023.12.3.230

Introduction

The term "chronic renal failure" refers to damage that has been present in the kidney for at least three months and can be identified by symptoms of a pathological condition or kidney failure such as proteinuria (Wise *et al*., 2012).

If there are no other symptoms, a diagnosis of kidney failure will be made based on a glomerular filtration rate of 60mL/minute/1.73m2 for more than three months. This criterion is used regardless of whether or not there are additional symptoms (Roberts *et al*., 2021). Because of the potential for antibiotics to cause nephrotoxicity, patients who have chronic renal failure should always use extreme caution when taking antibiotics (Kenward & Tan, 2003). Patients who have renal failure need to have their antibiotic effectiveness and dosage evaluated because their kidneys are unable to filter out hazardous bacteria as well as healthy kidneys. Because some antibiotics are known to harm the kidneys, it is essential to exercise extreme caution when using them (Crass *et al*., 2019).

Chronic kidney disease (CKD) has been increases those days vigorously, the rising prevalence of CKD over the past few decades has been a major challenge for healthcare systems around the world. Meta-analysis conducted recently estimated the global prevalence of CKD to be 13.4%. It was estimated that 9.1% of the global population had CKD in 2017 and that it had caused 1.2 million fatalities. According to research, the mortality rate of people with ESKD is 17 times greater than that of healthy people of the same age and gender. Approximately 2.4–4.8 million lives would be lost to CKD by 2040. CKD is a risk factor for cardiovascular disease and can lead to end-stage kidney failure and premature death. In fact, poor kidney function is responsible for around 7% of the global burden of cardiovascular disease. Since the prevalence of ESKD among Saudi citizens has been steadily rising over the past few decades, CKD has emerged as a pressing public health issue in the Kingdom of Saudi Arabia (Al-Obaidi,2021). This condition is defined by a glomerular filtration rate (GFR) that is lower than 60 mL/min/1.73 m2. Patients who have chronic kidney disease are at a greater risk of getting infections because their humoral and cellular immune systems are impaired (Sutter *et al*., 2015). Infections are the second most common cause of death in people who have a more advanced stage of CKD. Because of this, antibiotics are frequently used to treat these patients, which calls for an increased level of vigilance (Veiga and Paiva, 2018).

Due to the changes in pathophysiology that accompany renal failure, antibiotics might not be excreted, absorbed, distributed, or broken down adequately in persons who have the condition. This is due to the fact that renal failure causes changes in pathophysiology. If doses are not modified to account for diminished renal function, these alterations to medication action could lead to dangerous buildup of the drug (Gallagher and MacDougall, 2022). For example, beta-lactams have the potential to cause damage to the nervous system, whilst aminoglycosides and glycopeptides have the potential to cause damage to the kidneys and the auditory system, respectively. The dosage can be adjusted in a variety of different ways.

Methodical dosing means lowering the total amount of each medication while maintaining the existing schedule (Nachtigall *et al*., 2014). It is recommended to use the interval method for "time-dependent" antibiotics. This method involves maintaining unit doses and spacing out administrations. The goal of this method is to maintain concentrations above the minimum inhibitory concentration (MIC) for as long as possible over 24 hours, depending on the severity of the infection. The interval method involves maintaining unit doses. This method is preferred when treating with "concentration-dependent" antibiotics (Roberts *et al*., 2012) since the maximum concentration (C_{max}) is the most critical pharmacokinetic parameter associated with efficacy.

When either the dose approach or the interval method is unable to attain the necessary concentrations or offer sufficient therapeutic coverage in between administrations, a combination of the two strategies is utilized (the "mixed technique") (Barnett and Cummings, 2018).

The fundamental goal is to achieve a concentration of antibiotics that is therapeutically effective, which means that they are useful without also being hazardous (Hawkey and Livermore, 2012). Since aminoglycosides and vancomycin are the only two groups of medications for which therapeutic drug monitoring is routinely provided in hospitals, we should express our gratitude for this development all the more (Veiga and Paiva, 2018).

It is recommended that routine monitoring of renal function with the CKD-EPI formula be performed in order to determine any necessary modifications to the dose. GFR is stated in millilitres per minute (mL/min), with the actual body surface area of the patient serving as the basis for the calculation. The standard unit of measurement for GFR is

millilitres per minute (1.73 metres squared) (Wirz *et al*., 2018). It is not recommended to use this formula for calculating patients who have a body mass index (BMI) of less than 18.5 kg/m2 or who have acute kidney injury. The Cockcroft-Gault formula, which is less accurate, should not be used because it has not been validated using the most up-to-date methods for measuring creatinine, and because it has not been shown to work for adults with a body mass index (BMI) below 18.5 or above 30. This is because the formula has not been validated using the most up-to-date methods for measuring creatinine. In general, there is not a great deal of evidence to support its utilization in the process of titrating dosages (Hake *et al*. 2015).
If adjustments to dosages are made on the fly (Charan *et al*., 2013), for example in an empirical manner, there is a strong probability that the patient will not receive the appropriate amount of medication. As a consequence of this, it ought to be standard practice to report findings from studies that included participants with CKD. In the same way that the United States of America maintains the Physicians' Desk Reference, the European Union maintains the Summary of Product Characteristics (SPC) (Jensen *et al*., 2012). The vast bulk of the information that makes up the SPC comes from research that was carried out many years ago, and the antibiotic doses that were used in those studies are frequently unsuitable for patients in the contemporary era. SiteGPR is a site that focuses on drug management for persons who are living with chronic kidney disease. It is intended for use by medical professionals (Moenster *et al*., 2014). The proposed changes to dosage are informed by recent research findings on pharmacokinetics, the effectiveness of medications, and individuals with chronic renal failure (Fugate *et al*., 2013).
According to a large number of studies that were conducted in the past, renal insufficiency affects between 11 and 13 percent of the population when the glomerular filtration rate (GFR) is less than 60 mL/min (Oberoi *et al*., 2015). It is believed that twenty percent of people who are admitted to hospitals have some kind of kidney problem. The glomerular filtration rate (GFR) is said to be in the "creatinine-blind range" when it falls between 60 and 120 mL/min. A glomerular filtration rate (GFR) that is lower than 60 millilitres per minute, which denotes stage 1 or stage 2 chronic kidney disease, is one indicator of declining kidney function in the elderly.
Many programs are set to combat drug resistance from the unappropriated uses of antibiotics in hospitals, especially for patients with chronic states such as renal diseases, these programs are called antimicrobial stewardship programs, and they are set to resolve any inappropriateness' level from prescribers toward the chronically ill patients (Salah *et al*. 2021).
Therefore, this study aims to assess and evaluate the efficacy of antibiotics used for patients with chronic renal failure in Al Iman General Hospital, which is located in Riyadh, Saudi Arabia.

Patients and Methods
Tools include a form for recording information, the British National Formulary 2009, the Pharmacotherapy Handbook, and the Pedoman Umum Penggunaan Antibiotik dari Peraturan Kesehatan no.
Materials: The data for the materials came from the medical records of patients with chronic renal failure in AL-intensive Iman's care units (ICUs) and inpatient wards who met the inclusion criteria.

Sampling and Sample populations
All patients with chronic renal failure who were treated for an infection at Al-Iman Hospital between January 2022 and October 2022 and received antibiotics are included in the study's population and sample. There are a total of 48 individuals who were all diagnosed with chronic renal failure, had an infection, and took antibiotics.
The results of the calculations allow the following to be said about the Krejcie and Morgan (1970) table:

a. The assumption of reliability level 95%, because it uses value of X2= 3,741 that means that it uses $\alpha = 0.05$ on degree of freedom
b. The assumption of population variety (probability) that is included in the calculation is = 0.5
c. The assumption of estimated galat value 5% (0.05)
d. The sample population that was available was 48 samples.

Research Location
The research was carried out at Al-Iman Hospital in Al-Riyadh, Saudi Arabia.
2. The criteria for who can join and who can't
a. Inclusion criteria:

1) People in Al-Iman Hospital, Al-Riyadh, Saudi Arabia with long-term kidney failure in 2014.
2) The patients got antibiotics to therapy for the medication of the infection.
3) The complete data should at least include information about the patients, such as their medical record number, age, body weight, sex,

symptoms, diagnosis, medicines, dosage, antibiotics duration, date given, urea, kidney function test (BUN and creatinine in serum), leukocyte count number, and the last condition of the patients.

b. Criteria for being left out: The patients died from the medicine.

Statistical analysis

The data were analyzed by counting the number of times each of the four things was right: the right indication, the right patient, the right medicine, and the right amount.

You should write the mean of the right indication, the right patient, the right medicine, and the right amount.

$$\%\ \text{appropriate indication} = \frac{\text{the number of appropriate indication case}}{\text{total case}} \times 100\%$$

$$\%\ \text{appropriate patient} = \frac{\text{the number of appropriate patient case}}{\text{total case}} \times 100\%$$

$$\%\ \text{appropriate medicine} = \frac{\text{the number of appropriate medicine case}}{\text{total case}} \times 100\%$$

$$\%\ \text{appropriate dosage} = \frac{\text{the number of appropriate dosage case}}{\text{total case}} \times 100\%$$

Figure 1 The THREE rights for chronic renal failure patients (Woolf *et al*., 1999)

Laboratory investigations

1. Measuring the total kidney function profile (Serum Potassium, Sodium =, and phosphate)
2. Glomerular Filtration rate (GFR)

To set that all patients with GFR < 15 ml/min is considered as in danger state.

Statistical Analysis Methods

Using Chi square and some descriptive analytical methods in this study was done using SPSS program.

Results

The patients of Al-Iman Hospital in Al-Riyadh, Saudi Arabia who were diagnosed with chronic renal failure and received treatment were the subjects of this retrospective study. The data was collected from patients' medical records. A total of 58 patients met the study's inclusion criteria and were thus analyzed. However, the numbers only add up to 48 samples, according to the computations.

Patient-specific demographic and simple clinical data

About 48 of the samples taken from people at Al-Iman Hospital with chronic kidney failure met the criteria for inclusion, as shown by the study's findings. The following table details the patient's demographic information, including age, gender, and body mass index.

Table 1 The demographic data distribution among the study population

Age (Years old)	**Gender**	
	Male	Female
< 25	3 (6.25%)	1 (2.1%)
25-34	5 (13.9%)	1 (2.1%)
35-44	3 (8.3%)	2 (5.6%)
45-54	10 (22.2%)	8 (16.6%)
55-64	5 (13.9%)	0
65-74	2 (4.2%)	2 (5.6%)
>75	6 (12.5%)	0
Total	34 (70.8%)	14 (29.2%)
Body Mass Index (Kg/m^2)		
Normal	12 (25%)	14 (26.6%)
Obese	0	0
Underweight	6 (12.5%)	12 (25%)
Total	18 (37.5%)	26 (62.5%)

This information suggests that patients with chronic renal failure tend to be middle-aged, falling between the ages of 45 and 54. All patients, male and female, experienced this. In total, there were twenty patients with chronic renal failure, ten of whom were male (representing 22%) and eight of whom were female (representing 16%) According to information acquired from the Ministry of Health (MOH) from United states of America in 2013, the number of individuals over the age of 35 who suffered from chronic renal failure increased by a large margin. This was due to the kidneys not functioning properly and the muscles not being as robust as they should have been (Weinstein and Anderson, 2010).

Information regarding a patient's history of antibiotic use

The patient's medical record was examined in order to gather information regarding the patient's use of antibiotics during treatment at Al-Iman Hospital Drug Information Center (DIC) treatment installation for the following criteria.

According to the data, the antibiotic class known as meropenem was the one that was provided to patients with a chronic form of renal failure most of the time. Meropenem, an antibiotic in the class of drugs known as carbapenems, is used to treat the vast majority of patients. 21 patients, or 43.75% of the total number of patients receiving carbapenems, are prescribed these antibiotics.

Patients with chronic renal failure are the most common recipients of meropenem. Thalhammer and Horl (2000) found that it was a safe medicine for those with chronic renal failure, especially those with a creatinine clearance greater than 10 mL/minute and a wider range of activities.

Table 2 The data of antibiotics usage in Al-Iman Hospital

DATA (ANTIBIOTIC USAGE)		
GENERIC NAME	The amount of patient were given antibiotics	Patient number
MEROPENEM	21	1,3,4,5,6,9,21,23,24,25,26,27,28,30,31, 33,34,36,37,41,45
VANCOMYCIN	3	2,7,46
TIGECYCLINE	4	8,10,11,13
CEFTRIAXONE	3	12,14,15
CEFOTAXIME	7	16,17,18,19,20,22,29
TAZOBACTAM/PIPERACILLIN	10	32,35,38,39,40,42,43,44,47,48

Appropriate Indications

The care given was commensurate with the symptom. If the table below accurately depicts the symptoms and diagnosis, then the treatment given was correct.

The data showed that some antibiotics were used for no clear reason. In 18 of the cases (37.5%), antibiotics were prescribed even though there was no valid basis to do so, and in 3 of the cases (6.25%), there was a valid rationale; nonetheless, the prescription was not prescribed. In 18 cases, antibiotics were given when they weren't needed, while in 22 cases, they were given exactly when they should have been (45.83 percent).

Table 3 The appropriate indication of antibitoics use in this study

Diagnosis	**Antibiotic Use**	**Appropriateness level**	
		Appropriate	Not appropriate
CKD, Diarrhea	Yes	0	4
CKD, Bronchitis	Yes	3	
CKD, Pneumonia	Yes	14	8
CKD, Urinary Tract Infections (UTIs)	Yes after 3 days of infection	5	14
Total		22	26

Appropriate Patient

According to the physiological and pathological circumstances (contraindications) of the patient, the appropriate drug was delivered to the appropriate patient. These conditions are listed in the following table.

Table 4 The appropriateness of patients' eligibility criteria for antibiotics use

The criteria Evaluation	Antibiotic Name	Number
Appropriate	Meropenem	46
Inappropriate		
Appropriate	Vancomycin	2
Inappropriate		

The results showed that 46 out of 48 patients with chronic renal failure met the criteria for an appropriate patient, whereas only 2 out of 48 patients did not. This happened because the antibiotic vancomycin was prescribed to the patient incorrectly, and it did not agree with the patient's system. Even if the patient is receiving therapeutic therapy for their diarrhea, the British National Formulary 2009 recommends that they do not use vancomycin. This is the case even if the patient has diarrhea or severe renal failure.

Discussion

Appropriate Medications

Based on the criteria for the most effective medication to use in conjunction with antibiotics, the medication was given. This suggests that the precision of the treatment option was based on the ideal medicine for each problem that comes along with chronic renal failure in Al-Iman Hospital. Chronic renal failure is a condition in which kidney function gradually diminishes over time. There are eight distinct applications for antibiotics, each of which is listed in the table that follows. You can expect different results from each type.

It is well known as this because the data on antibiotic use in infected patients who have chronic renal failure show that 34 of these individuals, or 72.5 percent, are not receiving the right prescription since the antibiotic in question is not the therapy of choice. In 11 out of every 30 occurrences (29.5%), an antibiotic is the most appropriate treatment option. Both the Guideline for the Management of Community-Acquired Pneumonia in Adults and Dipiro's (2006) advice on the proper approach to utilize antibiotics have been examined alongside the obtained data.

Appropriate Dosage

If there is a note on the patient's prescription that says "appropriate dosage," it indicates that they were given the correct amount of medication. This means the dose given was appropriate for a person of the patient's age and condition. Since the individuals being evaluated have chronic renal failure, there is a direct correlation with the creatinine clearance value. The majority of patients (or 41.7% of the total) with chronic renal failure at the treatment center managed by The nephrology department were in stage IV, as is well known. This was followed by stage V, with 13 patients accounting for 33.3% of the total, stage III, with 10 patients accounting for 22.2% of the total, and stage II, with 8 patients accounting for 7.8% of the total.

As reported by Su *et al*. (2018), and other correlated studies, it was concluded as merged from this study and his study, When patients have a worse renal function when admitted to the hospital, they are more likely to develop several drug-resistant infections (MDRs). To the best of our knowledge, this is the first study to examine whether or not kidney function on admission is associated with infection by MDRs in individuals who do not have the end-stage renal disease (ESRD). Assuming this conclusion holds up in more studies, it could have significant clinical consequences. Because the discovered bacteria may be potentially resistant to first-line basic antibiotics, the presence of renal impairment on admission may serve as a caution to pay extra attention to the microbial culture results. Resistance to the standard antibiotic treatment means that the initial antimicrobial regimen will need to be modified. Our research shows that patients with renal impairment are at increased risk for MDRs infections.

According to the findings of RSUD's Dr. Moewardi, who conducted research on antibiotics for people with kidney failure in the year 2007, Sixteen percent of patients with renal failure were given the wrong dose of their antibiotic medication. It is not appropriate to prescribe antibiotics to the 1% of patients who have kidney disease. Only 10.9% of patients were given the appropriate dosage of the antibiotic, along with their medication. The majority of patients received

the appropriate quantity of antibiotics (81%) of the time. According to the findings, the use of antibiotics is responsible for the achievement of successful outcomes 45.5% of the time.

Patients on hemodialysis have been the subject of substantial research into MDR bacterial infections like MRSA and VRE (1,2). However, it is unclear whether this association also holds for less severe kinds of renal impairment that do not call for dialysis. According to the research of Shorr *et al*., long-term hemodialysis is a significant predictor of infections due to antibiotic-resistant bacteria. Data from the CDC's Active Bacterial Core surveillance (ABCs) system shows that the rate of invasive MRSA infection in dialysis patients is 100 times greater than in the general population14. There were 17,017 occurrences of bacteremia caused by methicillin-resistant Staphylococcus aureus in the UK in 2012, and 4.2% of those cases occurred in dialysis patients. Our findings showed that the risk of infection caused by MDROs rose steadily from the group with eGFR of 60 ml/min/1.73 m2 down to the group with eGFR of 30 ml/min/1.73 m2, where it peaked.

Renally compromised patients are more likely to develop infections that are resistant to several drugs. Antibiotic overuse is the primary trigger of ABR1. Because of their heightened susceptibility to infections, patients with lower eGFR are more likely to receive prescriptions for, or self-administer, antimicrobials than the general population. Patients with renal impairment may be more prone to infection as a result of compromised immunity, according to one theory. Excessive ROS production, hazardous product accumulation, and aberrant monocyte, T lymphocyte, and natural killer cell function have all been associated with this dysfunction. Individuals with severely reduced renal function engage with healthcare practitioners and the general patient population more frequently due to comorbidities and difficulties (e.g. hospitals). Furthermore, this increases the possibility that they will be exposed to MDROs. Findings from previous Chinese research corroborate the high prevalence of MDROs seen in ours (e.g., MDR Acinetobacter baumannii: 57.5-72.8%, MRSA: 44.6-73.5%). 23,24. China is one of the leading countries in antibiotic prescriptions, however, the country also has a significant problem with antibiotic abuse and overuse. This may be the reason why our study reported a higher prevalence of MDROs among the microorganisms analyzed compared to studies done in other Western countries. Since 2012, the Chinese central government has begun to address this problem by enforcing stricter antimicrobial stewardship policies, such as limiting antibiotic prescription to doctors, preventing self-prescription, developing audit and inspection systems, and investigating and re-assigning responsibility to hospital management staff who violate rational use policies. It may take some time, but steps are being taken to lessen patients' heightened sensitivity due to MDRO infection. In an effort to limit the emergence of antibiotic resistance, clinicians should pay close attention to eGFR on admission so as to direct appropriate initial and subsequent antibiotic treatment.

Also, Aloy et al. (2020) concluded that It is challenging to generalise recommendations regarding infectious infections to persons with CKD due to a lack of sufficient and high-quality evidence. Studies performed under conditions consistent with infectious disease prescription recommendations should be prioritised (dosage, indication, mode and route of administration). Pharmacokinetic parameters, efficacy, and safety in individuals with varying degrees of renal function should have been evaluated in these investigations. Many antibiotics have been sold commercially for many years. As a result, research including persons with CKD tend to be outdated and not conducted using modern prescribing practises.

It is possible for patients with CKD to use the indication and molecule selection for each condition they are afflicted with. However, renal insufficiency can alter the effectiveness of some antibiotics, particularly those used to treat UTIs. Antibiotic levels in the kidneys and urine, which are essential for treating many infections, may decline and become inadequate as GFR decreases. Neither Sulfamethoxazole nor Nitrofurantoin should be used alone to treat UTIs in people with CKD because of the low concentration of these antibiotics in urine.

These recommendations become more challenging to implement for patients with CKD when the dose schedule is altered for those with normal renal function. In most cases, the dose is greater than what is specified in the SPC. If a patient has normal renal function, the SPC may recommend a daptomycin dose between 4 and 6 mg/kg per day. When the GFR drops below 30 mL/min, the dosage is halved. Nonetheless, it is well-known that even when the infection is severe, such doses are typically insufficient. Dosing plans between 6-8 mg/kg/day and 10-12 mg/kg/day are recommended by most recent guidelines. Patients with CKD could, in theory, be helped by

following a 3-step plan. In patients with a GFR of 30 mL/min or less, the maximum recommended daily dose (MDD) should be reduced by 50%. However, in actuality, only clinical data from these individuals can confirm the drug's safety and efficacy. In reality, there is no linear relationship between medicine effectiveness and duration of administration. The processes of transport and metabolism both reach their limits. A medicine that is effective and well tolerated at a lower dose in one condition may become toxic or ineffective at a greater dose in another situation, even though the dose-reduction coefficient is the same. Research on the effects of daptomycin in persons with CKD or who undergo dialysis suggests that a dosage of 10 mg/kg given once every 48 hours is effective.

Antibiotics with relatively unchanged pharmacokinetics, such as tedizolid, do not require dosage adjustments for CKD patients. The lower renal clearance observed in persons with CKD is compensated for by an increase in clearance outside of the kidneys for certain compounds like doxycycline. Ceftriaxone and other antibiotics can be administered to persons with CKD without adjusting the dose; in fact, the maximum daily dose is 4 g. People with CKD have been shown to experience pharmacokinetic alterations, yet the benefit-to-risk ratio continues to favour overdose. Dose adjustment based on kidney function is unlikely to be effective, but an overdose is usually not life-threatening.

Incorporating microbiological cultures from linked electronic medical databases, this real-world study has solid methodology and an abundance of data. Although a high frequency of MDRs has been reported in China, we did find statistically significant differences in the risks of MDRs between the various eGFR categories. Studies done in specific locations, such as Guangzhou in southern China, may not be generalizable to the general population. Nonetheless, we postulate that related patterns may be seen in other communities with a comparable socioeconomic status and accessibility to antibiotics. The following disclaimers should be kept in mind when thinking about the results. We employed a single test of eGFR upon admission to characterise renal function since patients' renal function may not have reached steady state at the time of assessment. People with low eGFR upon hospital admission could not be properly classified as having either acute renal injury, chronic kidney disease, or a combination of the two. A sensitivity analysis showed no statistically significant differences between the primary analysis and one based on eGFR values determined between 1 and 12 months before hospitalization. Perhaps this was because of the limited size of the study population. The patient's history of hospitalization, whether or not antibiotics were administered prior to admission, and whether or not the patient had recently been in a nursing home may have influenced the results of the first positive culture, which was not taken into account. No statistically significant difference was found in the culture positive rates between patients in the various eGFR categories in this study's sample population. Unfortunately, we lacked access to a regional registry, so we couldn't see if a patient had ever been hospitalised or if they had ever been prescribed antibiotics. The presence of an organism in a culture does not prove that it is the causative agent of an infection; the growth could be the result of contamination or colonization. Clinical diagnosis based on symptoms was matched with the appropriate culture samples, which decreased the likelihood of a false-positive culture result. Our results could have been off by a small amount due to residual and mysterious confounding factors. The study was observational, so any conclusions about cause and effect should be treated with extreme caution.

Limitations

There was a lack of appropriate other clinical data, including family history and quality of life assessment after progressive use of antibiotics, and the data obtained was evaluated based on the researcher's comprehension ability, which could have been influenced by bias given the small sample size and the reliance on data from medical records, in which the writing may have been less understandable by the writer.

Conclusion and recommendations

The antibiotic that is mostly used for the patient with chronic renal failure was meropenem, that broad spectrum antibiotic that can be changed to another narrower in spectrum to keep the efficacy at long run, many other effective ways to prevent bacterial infections and control the infectious situations can be performed such as good hygiene and regular use of seasonal vaccines, all patients came to home with full healthy conditions and the infection exacerbation was limited successfully.

It is important for doctors to be more cautious when writing prescriptions. The improving role of pharmacists for the improvement of the health care status related to the medicine usage for the patients. More educative programs are needed to be used for combating drug resistance and

monitoring doctors prescribing manners and there is need for improvement in medical technology because of ambiguities in the language used to record medical data.

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