



**FACULTAD DE CIENCIAS DE LA SALUD
CARRERA PROFESIONAL DE MEDICINA HUMANA**

**“ADHERENCIA A PROFILAXIS QUIRÚRGICA EN CIRUGÍAS
OBSTÉTRICAS Y GINECOLÓGICAS EN DOS HOSPITALES DE
HUÁNUCO”**

Tesis para optar el grado académico de:
MAESTRO EN EPIDEMIOLOGÍA Y BIOESTADÍSTICA

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2023

ACTA DE SUSTENTACIÓN

Lima, 13 de junio de 2023.

Los integrantes del Jurado de tesis:

Presidente: Dr. Óscar Fausto Munares García
Miembro: Mg. Jorge Giusepi Huaranga Marcelo
Miembro: Mg. Fernando Miguel Runzer Colmenares

Se reúnen para evaluar la tesis titulada: "ADHERENCIA A PROFILAXIS QUIRÚRGICA EN CIRUGÍAS OBSTETRICAS Y GINECOLÓGICAS EN DOS HOSPITALES DE HUÁNUCO"

Presentada por la bachiller Franz Kovy Arteaga Livia
 Para optar por el Grado de Maestro en Epidemiología Clínica y Bioestadística
 Con la asesoría de: Mg. Oscar Guillermo Flores Flores

Luego de haber evaluado el informe final de tesis y evaluado su desempeño en la sustentación, concluyen de manera unánime calificar a:

Tesisista: Franz Kovy Arteaga Livia			Nota (en letras): Quince
Aprobado (X)	Aprobado - Muy buena ()	Aprobado - Sobresaliente ()	Desaprobado ()

Los miembros del jurado firman en señal de conformidad.



Dr. Óscar Fausto Munares García
Presidente del Jurado



Mg. Oscar Guillermo Flores Flores
Asesor



Mg. Jorge Giusepi Huaranga Marcelo
Miembro



Mg. Fernando Miguel Runzer Colmenares
Miembro

ANEXO 21: DECLARACIÓN DE ORIGINALIDAD DE INFORME FINAL DE TESIS

**UNIVERSIDAD CIENTÍFICA DEL SUR
DECLARACIÓN DE ORIGINALIDAD DE CONTENIDO DE INFORME FINAL
DE TESIS¹³**

Lima, 20 de mayo del 2023

Señor,
Carlos Zavalaga Reyes
Director General de Investigación, Desarrollo e Innovación
Universidad Científica del Sur
Presente. –

De nuestra consideración,

Yo: Franz Kovy Arteaga Livias, egresado de la maestría en Epidemiología Clínica y Bioestadística de la Universidad Científica del Sur, en conjunto con el asesor de tesis Oscar Flores Flores, declaramos que este informe final de tesis: ADHERENCIA A PROFILAXIS QUIRÚRGICA EN CIRUGÍAS OBSTETRICAS Y GINECOLÓGICAS EN DOS HOSPITALES DE HUÁNUCO, sustentado para obtener el grado de MAESTRO EN EPIDEMIOLOGÍA CLÍNICA Y BIOESTADÍSTICA es original.

Es decir, no contiene plagio parcial ni total, cuando se utilizó información de fuentes externas se reconoció la autoría mediante la adecuada citación y los resultados obtenidos son producto entero de mi (nuestra) investigación y no han sido falseados ni fabricados. Todo esto en cumplimiento del Código de ética en la investigación, Reglamento del Comité de Integridad Científica, Reglamento de Propiedad Intelectual, Normas y procedimientos de los trabajos de investigación para la obtención de títulos profesionales y grados académicos ¹⁴, que afirmamos conocer en su totalidad.

Por ello, en caso de identificarse alguna situación de plagio, falsificación o fabricación de resultados, nos allanamos al proceso de investigación que establezca la Universidad y las posibles sanciones que pudieran surgir.

Firmamos en conformidad con lo declarado,



FRANZ KOVY ARTEAGA
LIVIAS

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¹³ En conformidad con la Resolución del Consejo Directivo N° 084-2022-SUNEDU/CD

¹⁴ Los documentos están en: <https://investigacion.cientifica.edu.pe/reglamentos/>

INFORME DE REVISIÓN DE ORIGINALIDAD

Título del documento evaluado. Adherencia a profilaxis quirúrgica en cirugías obstétricas y ginecológicas en dos hospitales de Huánuco.

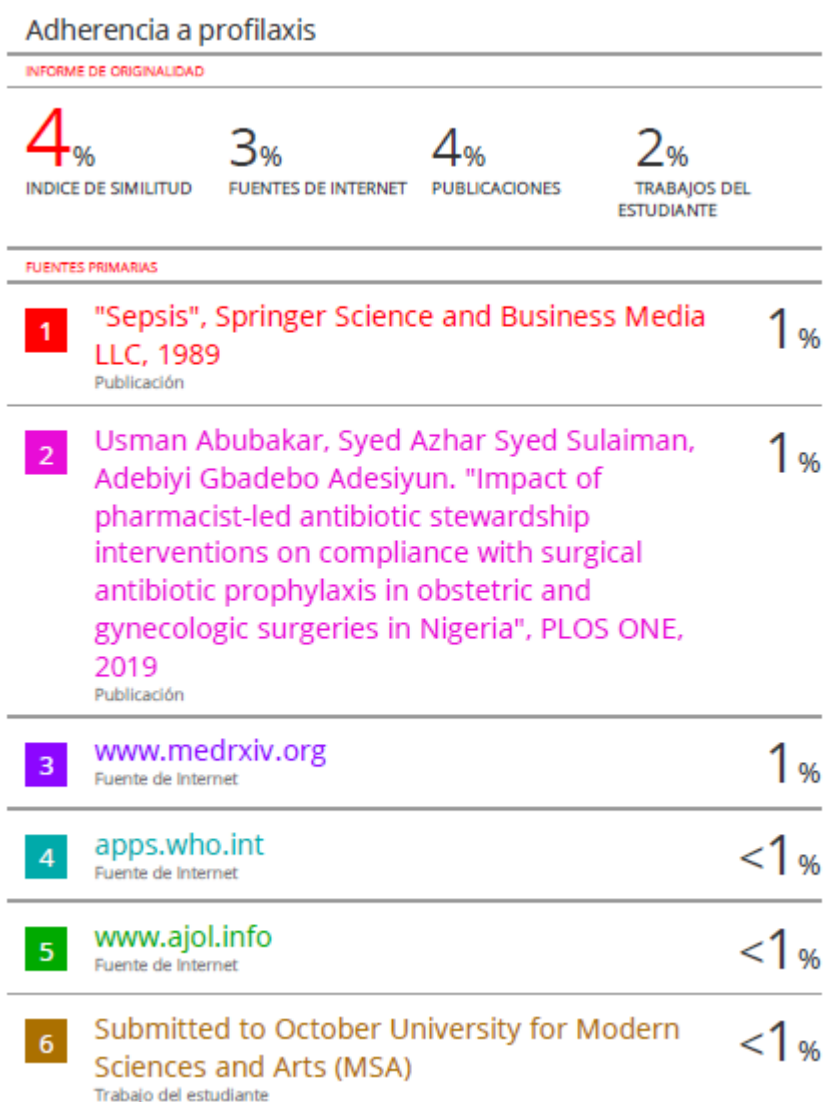
Autores. Franz Kovy Arteaga Livias.

Mecanismo de revisión de originalidad. Evaluación con Turnitin (ID 2120388634).

Resultado de la evaluación. 4%

Revisado por. Magaly Kelly Guerrero Huaracallo.

Comentarios sobre la revisión. Filtros usados: excluir fuentes de menos de 12 palabras.



DEDICATORIA:

A Dios, el Señor quien da la sabiduría e inteligencia.

A Vicky, por su amor incondicional y su apoyo.

A Andrea y Misael, las alegrías de mi corazón.

A mi madre, por sus cuidados y dedicación.

RESUMEN.

Introducción: Las infecciones del sitio quirúrgico (ISQ) pueden ser tan altas en las cirugías de ginecología y obstetricia en comparación con otras áreas. La profilaxis antimicrobiana es una herramienta efectiva en la prevención de las ISQ; sin embargo, muchas veces no es administrada adecuadamente, por lo que este estudio tuvo como objetivo conocer el cumplimiento y los factores asociados al uso de las guías de práctica clínica para la profilaxis antibiótica en cirugías ginecológicas en dos hospitales de la ciudad de Huánuco, Perú.

Métodos: Se realizó un estudio transversal analítico de todas las cirugías ginecológicas realizadas durante el año 2019. Se determinó el cumplimiento en base al antibiótico elegido, dosis, tiempo de administración, redosificación y duración de la profilaxis. Como factores relacionados se consideraron la edad, hospital de procedencia, presencia de comorbilidades, cirugía realizada, así como su duración, tipos de cirugía y anestesia. **Resultados:** Se recogieron 529 historias clínicas de pacientes sometidas a cirugía ginecológica con una mediana de edad de 33 años. El antibiótico profiláctico se indicó correctamente en el 55,5% de los casos, y la dosis fue correcta en el 31,2%. El cumplimiento total de las cinco variables evaluadas fue sólo del 3,9%. La cefazolina fue el antibiótico más utilizado. **Conclusiones:** Se identificó un bajo cumplimiento de las guías de práctica clínica institucional para la profilaxis antibiótica, lo que demuestra que la profilaxis antimicrobiana en los hospitales estudiados fue inadecuada.

ABSTRACT

Introduction: Surgical site infections (SSI) can be as high in gynecology and obstetrics surgeries compared to other areas. Antimicrobial prophylaxis is an effective tool in the prevention of SSIs; however, it is often not adequately administered, so this study aimed to understand the compliance and factors associated with the use of the clinical practice guidelines for antibiotic prophylaxis in gynecological surgeries in two hospitals in the city of Huanuco, Peru. **Methods:** An analytical cross-sectional study of all gynecologic surgeries performed during 2019 was performed. Compliance was determined based on the antibiotic chosen, dose, administration time, redosing, and prophylaxis duration. Age, hospital of origin, presence of comorbidities, surgery performed, as well as its duration, types of surgery, and anesthesia were considered as related factors. **Results:** We collected 529 medical records of patients undergoing gynecological surgery with a median age of 33 years. The prophylactic antibiotic was correctly indicated in 55.5% of cases, and the dose was correct in 31.2%. Total compliance with the five variables evaluated was only 3.9%. Cefazolin was the most commonly used antibiotic. **Conclusion:** Low compliance with the institutional clinical practice guidelines for antibiotic prophylaxis was identified, showing that antimicrobial prophylaxis in the hospitals studied was inadequate.

VERSIÓN APROBADA PARA PUBLICAR EN REVISTA

Compliance With Antibiotic Prophylaxis in Obstetric and Gynecological Surgeries in Two Peruvian Hospitals

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Abstract: Introduction. Surgical site infections (SSI) can be as high in gynecology and obstetrics surgeries compared to other areas. Antimicrobial prophylaxis is an effective tool in the prevention of SSIs; however, it is often not adequately administered, so the study aimed to know the compliance and factors associated with the use of the clinical practice guidelines for antibiotic prophylaxis in gynecological surgeries in two hospitals in the city of Huanuco, Peru. Methods. An analytical cross-sectional study of all gynecologic surgeries performed during 2019 was performed. Compliance was determined based on the antibiotic chosen, dose, administration time, redosing, and prophylaxis duration. Age, hospital of origin, presence of comorbidities, surgery performed, as well as its duration, types of surgery, and anesthesia were considered as related factors. Results. We collected 529 medical records of patients undergoing gynecological surgery with a median age of 33 years. The prophylactic antibiotic was correctly indicated in 55.5% of the cases, and the dose was correct in 31.2%. Total compliance to the five variables evaluated was only 3.9%. Cefazolin was the most commonly used antibiotic. Conclusion. Low compliance with the institutional clinical practice guidelines for antibiotic prophylaxis was identified, showing that antimicrobial prophylaxis in the hospitals studied was inadequate.

Keywords: Compliance; Antibiotics; Surgical Site Infections; Prophylaxis; Gynecologic surgeries

1. Introduction

Surgical site infections (SSIs) are the most frequent nosocomial infections in developing countries [1,2]. SSIs pose a significant burden in terms of morbidity, mortality, and hospital costs. Patients who develop an SSI have a twofold increased risk of death and up to a 6-fold increased chance of readmission after discharge, as well as a twofold increased risk of admission to intensive care, with a concomitant risk of prolonged hospital stay [3]. SSIs are a major source of healthcare expenditure in the Region of the Americas, with estimates suggesting that they cost between US\$ 3.5 to 10 billion annually. In addition to the direct costs of treatment, SSIs also result in approximately 90,000 readmissions each year, incurring an additional cost of US\$ 700 million [4].

It has been described that cesarean delivery is associated with a 20 times higher risk of infection compared to vaginal delivery, with a rate of infection reported to be 1–25% [5] in developed countries and an estimated 10–48% of women delivering via cesarean in Sub-Saharan Africa [6]. These surgeries are complicated by SSIs, endometritis, and urinary tract infections if prophylactic antibiotics are not used [7]. Of the total number of gynecological surgeries, SSIs may develop up to 10% [8]. The incidence of SSI can be as high in procedures performed in gynecology and obstetrics when compared to other areas [1,9,10].

Antibiotic prophylaxis is defined as a brief course of antibiotic use initiated close to the surgical procedure and aimed at reducing the likelihood of developing SSIs [11]. Antibiotic prophylaxis is aimed at obtaining bactericidal levels in the tissue at the time of the incision and at reducing the bacterial load intraoperatively [12]. Although antibiotic prophylaxis has proven to be an effective tool in preventing SSIs, in Peru and many other countries, its use is not regulated [13]. In hospitals with procedural guidelines, medical prescribers often do not follow them adequately.

Compliance with clinical practice guidelines is crucial for ensuring appropriate and effective use of antibiotics. These guidelines offer recommendations for the selection, timing, and duration of antibiotic prophylaxis based on patient characteristics and the surgical procedure [14]. However, reports have shown that broader spectrum antibiotics, unnecessary combinations of antibiotics, suboptimal timing, and prolonged duration of surgical antibiotic prophylaxis are being used [3].

Mistakes in the administration of antibiotic prophylaxis are common, with errors such as delayed initiation of antibiotics after the incision or even after the entire surgical procedure, use of antibiotics not recommended for a specific surgery, and inadequate dosing being reported. Patients admitted to gynecology and obstetrics wards are at higher risk of not receiving appropriate antibiotic prophylaxis for more than 24 hours [11].

The inappropriate use of antibiotic prophylaxis and the overuse of antibiotics have resulted in numerous negative outcomes, including increased adverse reactions, hospital cost overruns, bacterial resistance, and superinfections [12]. The World Health Organization (WHO) has identified antibiotic resistance as one of the top ten global public health threats facing humanity today [15]. Non-compliance with appropriate use of antibiotics can be caused by various factors, including lack of awareness, knowledge gaps, misperceptions, cultural or institutional barriers, and competing priorities. For these reasons, it is essential to promote the rational and efficient use of antimicrobials to ensure their appropriate use [16].

Enhancing compliance with clinical practice guidelines for antibiotic prophylaxis is a crucial strategy for reducing inappropriate use of antibiotics. To address incorrect use, it is essential to judiciously follow the clinical practice guidelines that have already been published by various societies and institutions. By promoting adherence to established guidelines, healthcare providers can ensure that antibiotics are used appropriately and in the best interests of patient health. [17,18].

The purpose of this study was to assess compliance with the American Society for Hospital Pharmacists (ASHP) clinical practice guidelines for antibiotic prophylaxis published in 2010 in two hospitals located in Huanuco, Peru. Additionally, we aimed to identify factors associated with compliance in these settings.

2. Results

During the study period, 529 medical records were collected from patients who underwent gynecological surgery with a median age of 33 years, the cesarean section being the most frequently performed surgery in 57.1% of the cases. The prophylactic antibiotic was correctly indicated in 55.5% of the cases, and the dose was correct in 31.2%. Complete compliance to the five variables evaluated was only 3.9% (Table 1).

Table 1. Clinical and prophylaxis characteristics of patients undergoing gynecological surgeries (n=529).

Characteristics	Frequency	Percentage
Age		
Median (IQR)	33 (28 - 38)	
Hospital		
EsSalud	308	58.2
Minsa	221	41.8
Comorbidities		
HIV	1	0.2
Anemia	1	0.2
Diabetes	2	0.3
Hypertension	4	0.8
No	521	98.5
Surgery		
Cesarean	302	57.1
Uterine curettage	129	24.4
Hysterectomy	55	10.4
Others	43	8.1
Type of procedure		
Emergency	319	60.3
Programmed	210	39.7
Anesthesia type		
Regional	357	67.5
General	154	29.1

Sedoanalgesia	18	3.4
Length of surgery (min)		
Median (IQR)	90 (60 - 130)	
Correct prophylactic antibiotic		
Yes	112	55.5
No	90	44.5
Correct prophylactic dose		
Yes	63	31.2
No	139	68.8
Time of proper administration		
Yes	105	51.9
No	97	48.1
Redosing		
Yes	1	6.3
No	15	93.7
Correct length of prophylaxis		
Yes	42	20.8
No	160	79.2
Acceptable compliance		
Yes	52	9.8
No	477	90.2
Total compliance		
Yes	21	3.9
No	508	96.1

With regards to the prophylaxis administered, our findings reveal that 94.5% of the patients were prescribed antibiotics, with 38.2% receiving antibiotic prophylaxis. Cefazolin was the most frequently used antibiotic in both cases (Table 2).

Table 2. Characteristics of antibiotic administration to patients undergoing gynecological surgeries (n=529).

Antibiotic indication			
Yes	500	94.5	
No	29	5.5	
Antibiotics used			
Cefazoline	188	37.6	
Ceftriaxone	145	29	
Clindamycin	43	8.6	
Clindamycin + Gentamicin	34	6.8	
Ceftriaxone + Clindamycin	16	3.2	
Ceftriaxone + Clindamycin + Gentamicin	13	2.6	

Ceftriaxone + Gentamicin	6	1.2
Cefalexin	6	1.2
Cefazolin + Gentamicin	3	0.6
Cefazolin + Gentamicin + Chloramphenicol	3	0.6
Ciprofloxacin	3	0.6
Others	40	8
Antibiotic regimen indicated		
Single	415	83
Double	63	12.6
Triple	22	4.4
Antibiotic prophylaxis		
Yes	202	38.2
No	327	61.8
Prophylactic antibiotics used		
Cefazolin	116	57.4
Ceftriaxone	45	22.3
Chloramphenicol	13	6.4
Gentamicin	12	5.9
Clindamycin	10	4.9
Others	6	3.1
Indicated prophylactic antibiotic regimen		
Single	197	97.5
Double	4	1.9
Triple	1	0.5
Antibiotic treatment at discharge		
Yes	358	67.7
No	171	32.3
Antibiotics indicated at discharge		
Cefalexin	224	62.6
Dicloxacillin	21	5.9
Gentamicin	21	5.9
Gentamicin + Ceftriaxone	21	5.9
Ceftriaxone	16	4.5
Clindamycin	12	3.3
Others	43	11.9
Indicated discharge antibiotic regimen		
Single	318	88.8
Double	37	10.4
Triple	3	0.8

Finally, when comparing patient characteristics with the type of compliance, we observed

that the surgery performed, the type of procedure, and the type of anesthesia were related to total compliance, while the hospital, the surgery performed, and the type of procedure to acceptable compliance (Table 3).

Table 3. Comparison of factors related to acceptable or total compliance in patients undergoing gynecologic surgery.

	Acceptable compliance		p	Total compliance		p
	Si (%)	No (%)		Si (%)	No (%)	
Age			0.12			0.56
Median (IQR)	30.5 (26 - 37.5)	33 (28 - 38)		35 (30 - 40)	33 (28 - 38)	
Hospital			<0.01			0.21
EsSalud	18 (5.8)	290 (94.2)		15 (4.9)	293 (95.1)	
Minsa	34 (15.4)	187 (84.6)		6 (2.7)	215 (97.3)	
Comorbidities			0.34			0.56
Si	52 (9.9)	469 (90.1)		21 (4.1)	500 (95.9)	
No	0 (0)	8 (100)		0 (0)	8 (100)	
Surgery			0.04			0.03
Cesarean	38 (12.6)	264 (87.4)		11 (3.6)	291 (96.4)	
Uterine curettage	11 (8.5)	118 (91.5)		10 (7.8)	119 (92.2)	
Hysterectomy	2 (3.6)	53 (96.4)		0 (0)	55 (100)	
Others	1 (2.3)	42 (97.7)		0 (0)	43 (100)	
Type of procedure			0.01			0.02
Emergency	40 (12.5)	279 (87.5)		18 (5.6)	301 (94.4)	
Programmed	12 (5.7)	198 (94.3)		3 (1.4)	207 (98.6)	
Anesthesia type			0.31			0.04
Regional	38 (10.6)	319 (89.4)		10 (2.8)	347 (97.2)	
General	14 (9.1)	140 (90.9)		11 (7.1)	143 (92.9)	
Sedoanalgesia	0 (0)	18 (100)		0 (0)	18 (100)	
Length of surgery (min)			0.32			0.08
Median (IQR)	80 (63.5 - 110)	90 (60 - 135)		75 (45 - 99)	90 (60 - 132.5)	

3. Discussion.

The use of antimicrobial prophylaxis in obstetric and gynecologic surgeries varies considerably according to geographical areas, socioeconomic and cultural contexts. The present study found that, of the total number of surgeries, antibiotics were used in 94.5%; however, the indication for antibiotic prophylaxis only corresponded to 38.2%. This is different from what was found by Uppendahl and Gil, who, in their respective studies, found a frequency of use of prophylaxis above 95% [19,20], even lower than that described by Romero, in a Latin American context, where the overall use of antimicrobial prophylaxis was 69.9% [13]. The low adherence to prophylaxis in Peru is notorious. In a Latin American study of point prevalence of antibiotic use, Peru together with Mexico were the countries with the lowest adherence [21].

It has been shown that the publication and follow-up of clinical practice guidelines improve the proper prescription of antimicrobial prophylaxis in surgery in hospitals where they have been implemented [22–24]. A study evaluating surgeons' surgical prophylaxis practices found that gynecologists administered antimicrobial prophylaxis at the correct time only 51.5% of the time, and up to 35.5% administered it together with the incision [25]. At the same time, anesthesiologists appeared to adhere more to antimicrobial prophylaxis in cesarean-type surgeries [26]. Under these considerations, most hospitals now have an anesthesiologist administering antimicrobial prophylaxis.

While in surgeries that used antibiotics in general, cefazolin corresponded to only 37.6% of all indications, in cases where antimicrobial prophylaxis was indicated, cefazolin was used in 57.4%. A study in Jordan found that cefazolin was 85.4%, but in its correct dose, it was only 62.3% [27], while in Latin America, the use of this antibiotic was also relatively high [17]. The rest of the antibiotics used vary according to regions and studies: ceftriaxone, metronidazole, azithromycin, aminoglycosides, etc., making their comparison difficult and unnecessary.

The present study has shown that the use of multiple antibiotics was more frequent in cases of treatment compared to prophylaxis. Specifically, 17% of cases involved the use of more than two antibiotics in treatment, while only 2.5% did so in prophylaxis. This finding highlights the importance of rational and conscientious antibiotic prophylaxis. Physicians who correctly prescribe antibiotic prophylaxis tend to use only one antibiotic, which is a significant advantage. However, previous studies have shown that antibiotic combination is still prevalent in some cases of prophylaxis, with Alemkere reporting that 39% of prophylaxis cases used antibiotic combinations [11]. In another study, Abubakar found redundant combinations in 99% of cases, which decreased to 76% after educative intervention [3]. The high proportion of antibiotic combinations (such as Clindamycin + Gentamicin or Ceftriaxone + Clindamycin) may stem from a fear of multiple bacterial etiologies causing SSIs. However, some combinations (such as Ceftriaxone + Clindamycin + Gentamicin, Ceftriaxone + Gentamicin, Cefazolin + Gentamicin, or Cefazolin + Gentamicin + Chloramphenicol) have similar coverage without adequate rationale for their use.

Even after discharge, a significant proportion of patients were found to continue using antibiotics. Alexiou's research showed that 15% of gynecologists prescribed antibiotic prophylaxis for two days or more [25], while Aulakh and Romero's studies reported that 100% of patients received antibiotics after surgery [13,28]. The overuse of antibiotics is a global concern, and efforts to improve prescribing practices should focus on reducing this unnecessary prolonged use. These practices not only contribute to the growing problem of antibiotic resistance, but also increase the risk of adverse effects and unnecessary healthcare costs.

The study revealed that the highest frequency of compliance was observed in the choice of the right antibiotic, while the lowest frequencies of compliance were observed in relation to redosing and duration of prophylaxis. A study in Israel showed that 95.6% of patients received the correct antibiotic [29]. In contrast, a study in Spain identified timing of initiation and correct antibiotic selection as the main causes of noncompliance [20]. Importantly, differences in compliance rates could be attributed to the presence of antibiotic optimization and monitoring units in some hospitals. These units are not present in either of

the two hospitals studied.

The study's findings regarding compliance with prophylaxis protocols in surgical patients are concerning. Total compliance with all five correct parameters was found to be only 3.9%, despite the fact that only clean and clean-contaminated surgeries were included in the analysis - all of which should have received prophylaxis instead of antibiotic treatment. When considering the appropriate choice of antibiotic and dose, as well as an additional correct parameter, acceptable compliance rates only reached 9.8%. These results are consistent with those of previous studies. Abdel et al. reported overall adherence of only 2.7% in all surgeries [27]. In a large cohort study of over 400,000 cases in the United States, antibiotic adherence was found to be only 35.9% [30].

The study found that the type of surgery was a statistically significant factor associated with both total and acceptable compliance, with cesarean sections showing better adherence to prophylaxis protocols compared to other types of surgeries. These findings are consistent with those of previous studies. For example, Uppendahl reported that myomectomy, laparoscopy, and ectopic pregnancy procedures received agents that were contrary to recommendations in up to 96% of cases [19]. In contrast, Tietel found that adherence to prophylaxis protocols was over 90% in cesarean sections [29]. Kremer, on the other hand, found that adequate adherence to antimicrobial prophylaxis decreased significantly [8]. These results highlight the importance of considering the type of surgery when designing interventions to improve compliance with prophylaxis protocols. Cesarean sections, in particular, may require less specific attention due to their higher compliance rates compared to other types of surgeries.

The results indicate that there is a higher level of adherence to prophylaxis guidelines in emergency surgeries compared to scheduled surgeries. This is supported by Abubakar's study, which demonstrates that the correct administration of prophylaxis is more frequent in emergency surgeries [1]. However, this finding is not consistent across all studies. For example, research conducted in Jordan has shown that emergency surgeries carry a greater risk of prolonged antibiotic therapy [27], while inadequate use of prophylaxis is more prevalent in emergency surgeries in the United States [30]. Despite some variability in the use of prophylaxis guidelines in emergency surgeries across different regions, the evidence suggests that compliance is generally higher in emergency surgeries than in scheduled surgeries.

There were statistical differences regarding the type of anesthesia, being better in general anesthetics. This differs from that shown by Polla, where local anesthesia was more likely to receive adequate antibiotic prophylaxis [31]. These differing results suggest the need for further research to better understand the relationship between type of anesthesia and antibiotic prophylaxis in order to optimize patient outcomes.

The hospital of origin was found to have statistical differences only for acceptable compliance, but not for total compliance. Previous studies, such as Brubaker's, have found geographic differences in the likelihood of receiving the correct antibiotics, while Hamdaoui found that the proportion of antibiotic prophylaxis increased with the number of procedures, particularly in the case of abortion prophylaxis [7,32]. These results suggest that even factors as little considered as hospital and geographic location may influence compliance with antibiotic prophylaxis guidelines.

The present study has certain limitations that must be pointed out. First, the statistical results may be affected due to the low proportion of cases with adequate compliance. However, this was partly mitigated by categorizing compliance as complete or acceptable, resulting in consistent results among factors associated with compliance. Second, limited data on certain groups of related factors may restrict the generalizability of these findings to the broader population. Moreover, the study did not consider variations in surgical techniques or practices among surgeons, which could also affect compliance rates nor the presence of pre-eclampsia or HELLP syndrome which although they do not usually require antibiotics beyond prophylaxis, patients with these conditions tend to have longer hospital stays, increasing the risk of iatrogenic infections and the need for antibiotic treatment. Finally, the study was conducted in only two institutions, which could limit the applicability of the findings to other healthcare settings or regions.

4. Materials and Methods

An analytical cross-sectional study with retrospective data was conducted in the gynecology and obstetrics services of all surgeries that received antimicrobial prophylaxis. Antimicrobial prophylaxis was defined as the use of antibiotics before surgery to prevent infections associated with the surgical site. Age, hospital of origin, presence of comorbidities, type of surgery performed, duration of surgery, types of surgery, and anesthesia were all considered as related factors for analysis. Elective and emergency procedures were included.

Data collection was performed in the gynecology and obstetrics services of the two leading hospitals of the city of Huanuco "Hospital Regional Hermilio Valdizan" and "Hospital II EsSalud-Huanuco" from January 1 to December 31, 2019. The selected hospitals serve as a point of reference for the entire region of Huanuco, offering gynecology and obstetrics services to a population of 375,000 women with over 80 available beds.

The data collection process was carried out over a period of four months, from January to April 2022, during which all medical records and operative reports from both hospitals were reviewed. However, to ensure the validity of the study, certain patients were excluded from the analysis. Specifically, those who had previously used antibiotics during hospitalization or undergone surgery within the preceding three months were excluded, as these factors may have influenced the use of antimicrobials not recommended for antibiotic prophylaxis. In addition, procedures performed on individuals with severe immunosuppression, those who had been hospitalized for more than 48 hours at the time of the procedure, individuals with suspected or confirmed colonization by resistant microorganisms, and those surgical histories and reports that did not present complete data related to prophylaxis were also excluded from the analysis.

The investigators followed the U.S. Center for Disease Control (CDC) wound classification to include only clean and clean-contaminated wounds: Class I/Clean wounds are those which are uninfected and do not encounter any inflammation. Additionally, these wounds do not enter the respiratory, alimentary, genital, or uninfected urinary tract. Clean wounds are typically closed and, if needed, drained with closed drainage. If operative incisional wounds are a result of non-penetration (blunt) trauma and meet the criteria, they should be included in this category. Class II/Clean-contaminated wounds refer to operative wounds where the respiratory, alimentary, genital, or urinary tracts are entered under controlled conditions, and there is no unusual contamination. This category includes operations that involve the

biliary tract appendix, vagina, and oropharynx, provided there is no evidence of infection or significant breach in technique.

All parameters were evaluated individually, according to the Guide for Surgical Prophylaxis published by the Institute for the Evaluation of Health Technologies and Research (IETSI) of the Peruvian Social Security (EsSalud). The IETSI guidelines follow the antibiotic prophylaxis guidelines of the United Kingdom and the American Society for Hospital Pharmacists (ASHP). The study established the following parameters:

- Antibiotic type: This was deemed correct if the antibiotics used were recommended by prophylaxis guidelines, and incorrect if any other antibiotic was administered.
- Appropriate dose: The dose was classified as correct if it corresponded to the dosage recommended by the prophylaxis guidelines, and incorrect if any other dosage was indicated.
- Time of administration: This parameter was considered correct if the antibiotic was administered within 60 minutes prior to the incision and incorrect if it was administered beyond 60 minutes or after the incision.
- Duration of prophylaxis: The prophylaxis duration was deemed correct if the antibiotic was stopped on the same day of the surgery and incorrect if the antibiotic continued to be administered in the following days.
- Need for redosing: Refers as correct to the administration of an additional dose of antibiotic during a surgical procedure when the procedure is prolonged beyond the recommended duration for the chosen antibiotic and was considered incorrect if the antibiotic was not re-administered or was administered before the recommended time.

For the purposes of the study, acceptable compliance was defined as prescriptions that adhered to the correct choice of antibiotic, appropriate dosage and redosing, and adherence to the recommended time or duration of prophylaxis. Meanwhile, total compliance was achieved when all five requirements were met for every surgery.

Stata v16 (StataCorp) was used for data analysis. The descriptive statistics used were mean, median, standard deviation, and percentiles according to their distribution for continuous variables and percentages for categorical variables. Only histories with complete data were used. Bivariate analysis was performed to explore the possible variables associated with total and acceptable compliance. The chi-square test was used to compare categorical variables, and the Mann-Whitney U test was used for nonparametric quantitative variables. The statistical significance level of $p < 0.05$ was predetermined.

This research was conducted in accordance with the ethical principles emanating from the regulatory standards for human health research and the Declaration of Helsinki of the World Medical Association and all its amendments. The Universidad Científica del Sur through Research Ethics Committee granted approval for the project, identified as number 026-2019. As the study relied on medical records, obtaining informed consent was not deemed necessary. This article represents the thesis submitted for a master's degree in Clinical

Epidemiology and Biostatistics at the Universidad Científica del Sur.

5. Conclusion

We conclude that antibiotic prophylaxis in gynecological surgeries in two hospitals in Huánuco is inadequate, and procedures have low compliance to institutional clinical practice guidelines. Cesarean sections and emergency surgeries are statistically related to better antibiotic prophylaxis prescriptions.

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Institutional Review Board Statement: The project was approved by the Research Ethics Committee of the Scientific University of the South, with number 026-2019.

Informed Consent Statement: Informed consent was not required due to the nature of the study when using medical records.

Data Availability Statement: The datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request.

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VERSIÓN INICIAL ENVIADA A PUBLICAR A REVISTA

COMPLIANCE WITH ANTIBIOTIC PROPHYLAXIS IN OBSTETRIC AND GYNECOLOGICAL SURGERIES IN TWO PERUVIAN HOSPITALS.

Short Title: Antibiotic prophylaxis in obstetric and gynecological surgeries in Peru.

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Abstract

Introduction. Surgical site infections (SSI) can be as high in gynecology and obstetrics surgeries compared to other areas. Antimicrobial prophylaxis is an effective tool in the prevention of SSIs; however, it is often not adequately administered, so the study aimed to know the compliance and factors associated with the use of the clinical practice guidelines for antibiotic prophylaxis in gynecological surgeries in two hospitals in the city of Huanuco, Peru.

Methods. An analytical cross-sectional study of all gynecologic surgeries performed during 2019 was performed. Compliance was determined based on the antibiotic chosen, dose, administration time, redosing, and prophylaxis duration. Age, hospital of origin, presence of comorbidities, surgery performed, as well as its duration, types of surgery, and anesthesia were considered as related factors.

Results. We collected 529 medical records of patients undergoing gynecological surgery with a median age of 33 years. The prophylactic antibiotic was correctly indicated in 55.5% of the cases, and the dose was correct in 31.2%. Total compliance to the five variables evaluated was only 3.9%. Cefazolin was the most commonly used antibiotic.

Conclusion. Low compliance with the institutional clinical practice guidelines for antibiotic prophylaxis was identified, showing that antimicrobial prophylaxis in the hospitals studied was inadequate.

Keywords: Compliance; Antibiotics; Surgical Site Infections; Prophylaxis; Gynecologic surgeries

INTRODUCTION

Surgical site infections (SSIs) are the most frequent nosocomial infections in developing countries [1,2]. SSIs pose a significant burden in terms of morbidity, mortality, and hospital costs. Patients who develop an SSI have a twofold increased risk of death and up to a 6-fold increased chance of readmission after discharge, as well as a twofold increased risk of admission to intensive care, with a concomitant risk of prolonged hospital stay [3].

It has been described that cesarean delivery is associated with a 20 times higher risk of infection compared to vaginal delivery. Without antibiotic prophylaxis, up to 30% of these surgeries are complicated by SSI, endometritis, and urinary tract infection [4]. Of the total number of gynecological surgeries, SSIs may develop up to 10% [5]. The incidence of SSI can be as high in procedures performed in gynecology and obstetrics when compared to other areas [1,6,7].

Antibiotic prophylaxis is defined as a brief course of antibiotic use initiated close to the surgical procedure and aimed at reducing the likelihood of developing SSIs [8]. Antibiotic prophylaxis is aimed at obtaining bactericidal levels in the tissue at the time of the incision and at reducing the bacterial load intraoperatively [9]. Although antibiotic prophylaxis has proven to be an effective tool in preventing SSIs, in Peru and many other countries, its use is not regulated. In hospitals with procedural guidelines, medical prescribers often do not follow them adequately. The inappropriate use of this prophylaxis and the overuse of antibiotics has also led to increased adverse reactions, hospital cost overruns, bacterial resistance, and superinfections [9]. For these reasons, the rational use of the antimicrobials used and the improvement of their efficient and appropriate use is necessary.

In the administration of antibiotic prophylaxis, it is common to find errors such as starting the use of antibiotics after the incision or even after the entire surgical procedure, use of antibiotics not indicated for this type of surgery, inadequate doses, etc. Patients admitted to gynecology and obstetrics wards had a higher risk of not receiving antibiotic prophylaxis for more than 24 hours [8].

Incorrect use can be counteracted by a judicious follow-up of the clinical practice guidelines already published by different societies and institutions, which would reduce costs and decrease SSI rates and benefits for patients undergoing these surgeries [10,11].

This research aimed to determine the compliance of gynecological surgeries to the clinical practice guidelines for antibiotic prophylaxis published by the American Society for Hospital Pharmacists (ASHP) in 2010 and to describe the factors associated with compliance in two hospitals in the city of Huanuco, Peru.

Methods.

An analytical cross-sectional study was performed out in the gynecology and obstetrics services of all surgeries that received antimicrobial prophylaxis, defined as the use of antibiotics prior to surgery in order to prevent the development of infections associated with the surgical site. Age, hospital of origin, presence of comorbidities, surgery performed, as well as its duration, types of surgery, and anesthesia were considered as related factors.

Data collection was performed in the gynecology and obstetrics services of the two leading hospitals of the city of Huanuco "Hospital Regional Hermilio Valdizan" and "Hospital II EsSalud-Huanuco" from January 1 to December 31, 2019. The chosen hospitals are referential for the whole region, with more than 80 beds for gynecology and obstetrics services for a population of 375,000 women.

All data were collected between January and April 2022. All medical records and operative reports from both hospitals were reviewed. Patients who had previously used antibiotics during hospitalization and those who had undergone surgery within the previous three months were excluded because of the possibility of conditioning the use of antimicrobials other than those recommended for antibiotic prophylaxis.

The investigators followed the U.S. Center for Disease Control (CDC) wound classification to include only clean (primarily noninfected closed wounds) and clean-contaminated (primarily surgeries admitted under controlled conditions and without unusual contamination) wounds. Elective and emergency procedures were included.

The antibiotic used, adequate dose, administration time, prophylaxis duration, and need for redosing were evaluated individually, according to the Surgical Prophylaxis Guide, published by the Institute for the Evaluation of Health Technologies and Research (IETSI) of the Peruvian Social Security (EsSalud). The IETSI guidelines follow the antibiotic prophylaxis guidelines of the United Kingdom and the American Society for Hospital Pharmacists (ASHP).

Acceptable compliance was considered to be those prescriptions with the correct choice of antibiotic, dose, and redosing and the correct time or duration of prophylaxis. At the same time, total compliance with all surgeries fulfilled the five complete requirements.

Stata v16 (StataCorp) was used for data analysis. The descriptive statistics used were mean, median, standard deviation, and percentiles according to their distribution for continuous variables and percentages for categorical variables. Only histories with complete data were used. Bivariate analysis was performed to explore the possible variables associated with total and acceptable compliance. The chi-square test was used to compare categorical variables, and the Mann-Whitney U test was used for nonparametric quantitative variables. The statistical significance level of $p < 0.05$ was predetermined.

The project was approved by the Research Ethics Committee of the Scientific University of the South, with number 026-2019. Informed consent was not required due to the nature of the study when using medical records. This article corresponds to the thesis for submission of a master's degree in Clinical Epidemiology and Biostatistics at the Universidad Científica del Sur.

Results

During the study period, 529 medical records were collected from patients who underwent gynecological surgery with a median age of 33 years, the cesarean section being the most frequently performed surgery in 57.1% of the cases. The prophylactic antibiotic was correctly indicated in 55.5% of the cases, and the dose was correct in 31.2%. Complete compliance to the five variables evaluated was only 3.9% (Table 1).

Table 1. Clinical and prophylaxis characteristics of patients undergoing gynecological surgeries (n=529).

Characteristics	Frequency	Percentage
Age		
Median (IQR)	33 (28 - 38)	
Hospital		
EsSalud	308	58.2
Minsa	221	41.8
Comorbidities		
HIV	1	0.2
Anemia	1	0.2
Diabetes	2	0.3
Hypertension	4	0.8
No	521	98.5
Surgery		
Cesarean	302	57.1
Uterine curettage	129	24.4
Hysterectomy	55	10.4
Others	43	8.1
Type of procedure		
Emergency	319	60.3
Programmed	210	39.7
Anesthesia type		
Regional	357	67.5
General	154	29.1
Sedoanalgesia	18	3.4
Length of surgery (min)		
Median (IQR)	90 (60 - 130)	
Correct prophylactic antibiotic		
Yes	112	55.5
No	90	44.5
Correct prophylactic dose		
Yes	63	31.2
No	139	68.8
Time of proper administration		

Yes	105	51.9
No	97	48.1
Redosing		
Yes	1	6.3
No	15	93.7
Correct length of prophylaxis		
Yes	42	20.8
No	160	79.2
Acceptable compliance		
Yes	52	9.8
No	477	90.2
Total compliance		
Yes	21	3.9
No	508	96.1

Regarding the characteristics of the prophylaxis administered, we found that 94.5% of the patients received antimicrobial indications, and 38.2% corresponded to antibiotic prophylaxis. In both cases, cefazolin was the most commonly used antibiotic (Table 2).

Table 2. Characteristics of antibiotic administration to patients undergoing gynecological surgeries (n=529).

Antibiotic indication		
Yes	500	94.5
No	29	5.5
Antibiotics used		
Cefazoline	188	37.6
Ceftriaxone	145	29
Clindamycin	43	8.6
Clindamycin + Gentamicin	34	6.8
Ceftriaxone + Clindamycin	16	3.2
Others	74	14.8
Antibiotic regimen indicated		
Single	415	83
Double	63	12.6
Triple	22	4.4
Antibiotic prophylaxis		
Yes	202	38.2
No	327	61.8
Prophylactic antibiotics used		
Cefazolin	116	57.4
Ceftriaxone	45	22.3
Cloranfenicol	13	6.4
Gentamicin	12	5.9

Clindamycin	10	4.9
Otros	6	3.1
Indicated prophylactic antibiotic regimen		
Single	197	97.5
Double	4	1.9
Triple	1	0.5
Antibiotic treatment at discharge		
Yes	358	67.7
No	171	32.3
Antibiotics indicated at discharge		
Cefalexin	224	62.6
Dicloxacillin	21	5.9
Gentamicin	21	5.9
Gentamicina + Ceftriaxona	21	5.9
Ceftriaxone	16	4.5
Clindamycin	12	3.3
Others	43	11.9
Indicated discharge antibiotic regimen		
Single	318	88.8
Double	37	10.4
Triple	3	0.8

Finally, when comparing patient characteristics with the type of compliance, we observed that the surgery performed, the type of procedure, and the type of anesthesia were related to total compliance, while the hospital, the surgery performed, and the type of procedure to acceptable compliance (Table 3).

Table 3. Comparison of factors related to acceptable or total compliance in patients undergoing gynecologic surgery.

	Acceptable compliance		p	Total compliance		p
	Si (%)	No (%)		Si (%)	No (%)	
Age			0.12			0.56
Median (IQR)	30.5 (26 - 37.5)	33 (28 - 38)		35 (30 - 40)	33 (28 - 38)	
Hospital			<0.01			0.21
EsSalud	18 (5.8)	290 (94.2)		15 (4.9)	293 (95.1)	
Minsa	34 (15.4)	187 (84.6)		6 (2.7)	215 (97.3)	
Comorbidities			0.34			0.56
Si	52 (9.9)	469 (90.1)		21 (4.1)	500 (95.9)	
No	0 (0)	8 (100)		0 (0)	8 (100)	
Surgery			0.04			0.03
Cesarean	38 (12.6)	264 (87.4)		11 (3.6)	291 (96.4)	
Uterine curettage	11 (8.5)	118 (91.5)		10 (7.8)	119 (92.2)	
Hysterectomy	2 (3.6)	53 (96.4)		0 (0)	55 (100)	

Others	1 (2.3)	42 (97.7)	0 (0)	43 (100)	
Type of procedure			0.01		0.02
Emergency	40 (12.5)	279 (87.5)		18 (5.6)	301 (94.4)
Programmed	12 (5.7)	198 (94.3)		3 (1.4)	207 (98.6)
Anesthesia type			0.31		0.04
Regional	38 (10.6)	319 (89.4)		10 (2.8)	347 (97.2)
General	14 (9.1)	140 (90.9)		11 (7.1)	143 (92.9)
Sedoanalgesia	0 (0)	18 (100)		0 (0)	18 (100)
Length of surgery (min)			0.32		0.08
Median (IQR)	80 (63.5 - 110)	90 (60 - 135)		75 (45 - 99)	90 (60 - 132.5)

Discussion.

The use of antimicrobial prophylaxis in obstetric and gynecologic surgeries varies considerably according to geographical areas, socioeconomic and cultural contexts. The present study found that, of the total number of surgeries, antibiotics were used in 94.5%; however, the indication for antibiotic prophylaxis only corresponded to 38.2%. This is different from what was found by Uppendahl and Gil, who, in their respective studies, found a frequency of use of prophylaxis above 95% [12,13], even lower than that described by Romero, in a Latin American context, where the overall use of antimicrobial prophylaxis was 69.9% [14]. The low adherence to prophylaxis in Peru is notorious. In a Latin American study of point prevalence of antibiotic use, together with Mexico were the countries with the lowest adherence [15].

It has been shown that the publication and follow-up of clinical practice guidelines improve the proper prescription of antimicrobial prophylaxis in surgery in hospitals where they have been implemented [16–18]. A study evaluating surgeons' surgical prophylaxis practices found that gynecologists administered antimicrobial prophylaxis at the correct time only 51.5% of the time, and up to 35.5% administered it together with the incision [19]. At the same time, anesthesiologists appeared to adhere more to antimicrobial prophylaxis in cesarean-type surgeries [20]. Under these considerations, most hospitals now have an anesthesiologist administering antimicrobial prophylaxis.

While in surgeries that used antibiotics in general, cefazolin corresponded to only 37.6% of all indications, in cases where antimicrobial prophylaxis was indicated, cefazolin was used in 57.4%. A study in Jordan found that cefazolin was 85.4%, but in its correct dose, it was only 62.3% [21], while in Latin America, the use of this antibiotic was also relatively high [10]. The rest of the antibiotics used vary according to regions and studies: ceftriaxone, metronidazole, azithromycin, aminoglycosides, etc., making their comparison difficult and unnecessary.

In the cases in which more than two antibiotics were used, 17% corresponded to treatment cases, while in prophylaxis, this situation occurred in only 2.5%. This is also an advantage of the rational and conscientious use of antibiotic prophylaxis. Physicians who correctly prescribe antibiotic prophylaxis tend to use only one antibiotic. Alemkere found that 39% of prophylaxis cases used antibiotic combination [8]. Abubakar found redundant combinations in 99% of cases, which dropped to 76% after intervention [3].

At discharge, even a high proportion of patients were still using antibiotics. Alexiou found that 15% of gynecologists indicated antibiotics for two days or more [19]. Similarly, Aulakh and Romero reported in their studies that 100% of patients received antibiotics after surgery [14,22]. This situation is a weakness of antibiotic prescribing worldwide, so efforts to improve prescribing should focus on this overuse.

The highest compliance was found in cases of choosing the correct antibiotic, with the lowest compliance in redosing and duration of prophylaxis. Similarly, in Israel, 95.6% received the right antibiotic [23]. In contrast, in Spain, it was found that the main causes of non-adherence were the time of initiation and the correct choice of antibiotic [13]. The presence of antibiotic optimization and control units in some hospitals could cause these different data.

Total compliance to the five correct parameters was only 3.9% of the total number of surgeries, remembering that only clean and clean contaminated surgeries were included, so all of them should have used prophylaxis and not antibiotic treatment. Likewise, when considering the adequate choice of antibiotic and its dose, plus the presence of an additional correct one, the acceptable compliance is only 9.8%. Abdel et al. found that overall adherence was only 2.7% of all surgeries [21]. A cohort of over 400,000 cases in the United States found that antibiotic adherence was 35.9% [24].

The type of surgery was statistically associated with both total and acceptable compliance,

being better in cesarean sections than in the rest of the surgeries. This is congruent with the findings of Uppendahl, who describes that myomectomy, laparoscopy, and ectopic pregnancy procedures received agents contrary to the recommendations of up to 96% [12]. Tietel found an adherence of over 90% in cesarean sections [23]. Kremer, on the other hand, found that adequate adherence to antimicrobial prophylaxis decreased significantly [5].

There is greater compliance to prophylaxis guidelines in emergency surgeries than in scheduled surgeries, which Abubakar also found, showing correct administration in emergency surgeries [1]. This differs from what was found in Jordan, where emergency surgeries had a higher risk of continuing antibiotic therapy [21], or in the United States, where the inadequate use of prophylaxis was more elevated in emergency surgeries [24].

There were statistical differences regarding the type of anesthesia, being better in general anesthetics. This differs from that shown by Polla, where local anesthesia was more likely to receive adequate antibiotic prophylaxis [25].

The hospital of origin was statistically different only for acceptable compliance, not total compliance. Brubaker found geographic differences in the likelihood of receiving correct antibiotics [4], as did Hamdaoui in the case of abortion prophylaxis, finding that the greater the number of procedures, the higher the proportion of antibiotic prophylaxis [26].

The study has several limitations. The low proportion of cases with adequate compliance could affect the statistical results. This has been resolved at least in part by the classification into complete and acceptable compliance, making it possible to have consistent results among the factors associated with compliance. Some groups of related factors have a small amount of data, which affects the extrapolation of these results to the general population.

We conclude that antibiotic prophylaxis in two hospitals in Huánuco is inadequate, and procedures have low compliance to institutional clinical practice guidelines. Cesarean sections and emergency surgeries are statistically related to better antibiotic prophylaxis prescriptions.

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COPIAS DE CARTAS DE RESPUESTA A LAS OBSERVACIONES DE LOS REVISORES DE LA REVISTA

Reviewer 1

Thanks for giving me the chance to review this manuscript. The study is interesting, but the following issue should be discussed:

Reply. Thank you for your review and suggestions that have improved the quality and presentation of our manuscript.

*The authors should clarify in the methodology section that the study is retrospective study.

R. Done. The suggested terms have been added.

*In section of Limitations, the word "acknowledged" is not suitable and should be replaced with a better one.

R. Done. The wording of this paragraph has been improved.

*Why did the authors choose the duration of records during 2019?

R. The authors chose the duration of the registries during 2019 because the study focused primarily on evaluating adherence to surgical prophylaxis during that specific period. While it is understood that the COVID pandemic has significantly impacted medical care, including surgical choices, indications, and hospitalization duration, opting for a longer period than 2020 may have potentially affected the results of the study.

*Assessment of Compliance is a complicated process, the authors should clarify in depth if high or complete compliance were related to the discharge from hospital?

R. In general, prescribers take little care in the type of prophylaxis indicated, so the characteristics of prophylaxis compliance have little impact on discharge decisions.

We hope that the results of this study can help gynecologists make better decisions when administering surgical prophylaxis.

Reviewer 2

Thanks for this study. Research on real-life abx use is highly relevant as this may direct stewardship interventions. I greatly enjoyed reading this manuscript, although it is striking to read that inadequate usage seemed to be that common.

Reply. We appreciate your review and suggestions, which have helped enhance the quality and presentation of our manuscript. Thank you for your valuable input.

1) What was the prevalence of pre-eclampsia and HELLP syndrome in this cohort? I can hardly believe it is no more than the 4 patients with hypertension that you outlined in table 1. The prevalence of pre-eclampsia is generally 3-7%, although this may vary in different races, but I assume your cohort represents higher risk obstetrics given the need for C-sections.

R. Thank you for noting this situation. Unfortunately, the point prevalence of Pre-eclampsia and HELLP syndrome in this cohort was not established. The 4 patients with AHT are prior history and do not represent current disease. We recognize that this situation could have affected the duration of antibiotic treatment and has been considered as a limitation of the study.

2) Were any of the patients known colonizers with resistant pathogens (e.g., MRSA, CRO, etc.) that could explain alternative prophylaxis regimens (e.g., clinda + gent). What is the general prevalence of MRSA in your local population?

R. As this is a retrospective study, the data necessary to correctly establish the frequency of previous colonization are not available. Our region lacks a lot of data and the prevalence of specific germs such as MRSA is not published. This could initiate more studies about the colonization by resistant germs in our region. In Peru, a study showed that the prevalence of MRSA nasal colonization is only 0.3% (<https://doi.org/10.1186/s40794-016-0025-x>).

3) Could you disclose/hypothesize the rationale for some prophylaxis regimens; e.g, ceftriax/clinda (did these patients have specific comorbidities), clinda/gent?

R. Thank you for your suggestion, we have added a discussion about it: "The high proportion of antibiotic combinations (such as Clindamycin + Gentamicin or Ceftriaxone + Clindamycin) may stem from a fear of multiple bacterial etiologies causing SSIs. However, some combinations (such as Ceftriaxone + Clindamycin + Gentamicin, Ceftriaxone + Gentamicin, Cefazolin + Gentamicin, or Cefazolin + Gentamicin + Chloramphenicol) have similar coverage without adequate rationale for their use".

4) As 14.8% of the cohort had other abx, I think it is prudent to specify the exact regimens.

R. Thank you for noticing. We have added more indicated antibiotic regimens.

Reviewer 2 / second review

Thanks for this revision.

Reply. Thanks for your invaluable suggestions.

A couple of comments from my side:

1. Line 102: what means "antimicrobial indications" in this sentence?

R. We have improved the wording of this paragraph to indicate that 94.5% of patients received antibiotics.

2. Line 216-17: HELLP/pre-eclampsia itself is not an indication for abx beyond prophylaxis, it may just increase the risk on iatrogenic infections since these patients are often admitted for longer. Please resonate this in this section.

R. Thank you for your suggestion, we have added the above.

VERSIÓN EN ESPAÑOL

CUMPLIMIENTO DE LA PROFILAXIS ANTIBIÓTICA EN CIRUGÍAS OBSTÉTRICAS Y GINECOLÓGICAS EN DOS HOSPITALES PERUANOS.

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Figures: 0

Tables: 3

Resumen

Introducción. Las infecciones de sitio quirúrgico (ISQ) pueden llegar a ser tan alta en cirugías de ginecología y obstetricia cuando se compara con otras áreas. La profilaxis antimicrobiana es una herramienta eficaz en la prevención de ISQ, sin embargo, muchas veces no se administra adecuadamente, por lo que el objetivo del estudio fue conocer el cumplimiento y factores asociados al uso de la guía de práctica clínica de profilaxis antibiótica en cirugías ginecológicas de dos hospitales de la ciudad de Huánuco, Perú.

Métodos. Se realizó un estudio transversal analítico de todas las cirugías ginecológicas realizadas durante el año 2019. El cumplimiento se determinó en base al antibiótico elegido, dosis, hora de administración, redosificación y duración de la profilaxis. Como factores relacionados se consideró la edad, el hospital de procedencia, la presencia de comorbilidades, la cirugía realizada, así como su duración, los tipos de cirugía y anestesia.

Resultados. Se recolectaron 529 historias clínicas de pacientes sometidas a cirugías ginecológicas con una mediana de edad de 33 años. El antibiótico profiláctico se indicó correctamente en el 55,5% de los casos y la dosis fue correcta en el 31,2%. La adherencia completa a las 5 variables evaluadas fue de solo 3,9%. La cefazolina fue el antibiótico más utilizado.

Conclusión. Se identificó un bajo cumplimiento de las guías de práctica clínica institucional de profilaxis antibiótica, observándose que la profilaxis antimicrobiana en los hospitales estudiados fue inadecuada.

INTRODUCCION

Las infecciones de sitio quirúrgico (ISQ) son las infecciones intrahospitalarias más frecuentes en países en vías de desarrollo [1]. Las ISQ suponen una importante carga en términos de morbilidad, mortalidad y costos hospitalarios. Los pacientes que desarrollan una ISQ tienen un riesgo doble de fallecer y hasta 6 veces mayor posibilidad de readmisión después del alta, además aumenta en dos veces el riesgo de ingresar a cuidados intensivos, con el concomitante riesgo de prolongar la estancia hospitalaria [2].

Se ha descrito que el parto por cesárea está asociado a 20 veces mayor riesgo de infección en comparación con el parto vaginal. Sin profilaxis antibiótica hasta el 30% de estas cirugías se complican con ISQ, endometritis e infección del tracto urinario [3]. Del total de cirugías ginecológicas, las ISQ se pueden desarrollar hasta el 10% [4]. La incidencia de ISQ puede llegar a ser tan alta en procedimientos realizados en ginecología y obstetricia cuando se compara con otras áreas [1,5,6].

La profilaxis antibiótica se define como un curso breve de uso de antibióticos, iniciado cercanamente al acto quirúrgico y cuyo objetivo es reducir la posibilidad del desarrollo de ISQ [7]. La profilaxis antibiótica está dirigida no solo para obtener niveles bactericidas en el tejido al momento de la incisión, sino también reducir la carga bacteriana en el intraoperatorio [8]. Aunque el uso de profilaxis antibiótica ha demostrado ser una herramienta eficaz en la prevención de ISQ, en el Perú, así como muchos otros países, su uso no está regulado y en los hospitales en los que se cuentan con una guía de procedimientos, muchas veces los prescriptores médicos no las siguen adecuadamente.

El uso inapropiado de esta profilaxis y el sobreuso de antibióticos ha condicionado también el aumento de reacciones adversas, sobrecostos hospitalarios, resistencia bacteriana y superinfecciones [8]. Por estas razones se hace necesario el uso racional de los antimicrobianos utilizados y mejorar su uso eficiente y adecuado.

En la administración de la profilaxis antibiótica es común encontrar errores como iniciar el uso de antibióticos después de la incisión o incluso después de todo el procedimiento quirúrgico, uso de antibióticos no indicados para este tipo de cirugías, dosis inadecuadas, etc. Pacientes admitidos a salas de ginecología y obstetricia tenían mayor riesgo de no recibir PA por más de 24 horas [7].

El uso incorrecto puede ser contrarrestado con un seguimiento juicioso de las guías de práctica clínica que ya están publicadas por distintas sociedades e instituciones, lo que traería una reducción de costos, disminución de las tasas de ISQ y beneficios para las pacientes sometidas a estas cirugías [9].

El objetivo de esta investigación fue conocer la adherencia de las cirugías ginecológicas a la guía de práctica clínica de profilaxis antibiótica publicada por la asociación americana de infectología farmacéutica en el 2010, así como describir cuáles son los factores asociados a la adherencia en dos hospitales de la ciudad de Huánuco, Perú.

Métodos.

Se realizó un estudio transversal analítico en los servicios de ginecología y obstetricia de todas las cirugías que recibieron profilaxis antimicrobiana, definida como el uso de antibióticos previo a la cirugía con el fin de prevenir el desarrollo de infecciones asociadas al sitio quirúrgico. Como factores relacionados se consideró la edad, el hospital de procedencia, la presencia de comorbilidades, la cirugía realizada, así como su duración, los tipos de cirugía y anestesia.

La recolección de datos se realizó en los servicios de ginecología y obstetricia de los dos principales hospitales de la ciudad de Huánuco “Hospital Regional Hermilio Valdizan” y “Hospital II EsSalud-Huanuco” desde el 01 de enero al 31 de diciembre del 2019. Los hospitales elegidos son referenciales de toda la región, contando en conjunto con más de 80 camas para los servicios de ginecología y obstetricia destinados a una población de 375000 mujeres. Toda la información se recolectó, entre enero y abril del 2022. Se revisaron todas las historias clínicas y reportes operatorios de ambos hospitales. Se excluyeron aquellas pacientes que habían utilizado antibióticos previamente durante la hospitalización, así como aquellas pacientes que habían sufrido alguna cirugía dentro de los tres meses previos, por la posibilidad de condicionar el uso de antimicrobianos diferentes a los recomendados para profilaxis antibiótica.

Los investigadores siguieron la clasificación de heridas del Centro de Control de Enfermedades de los Estados Unidos (CDC) para incluir solo las heridas limpias (principalmente heridas cerradas no infectadas) y limpias-contaminadas (principalmente cirugías ingresadas bajo condiciones controladas y sin contaminación inusual). Se incluyeron procedimientos electivos y de emergencia.

Se evaluaron individualmente el antibiótico utilizado, dosis adecuada, hora de administración, duración de la profilaxis y necesidad de redosificación, según la guía de Profilaxis Quirúrgica, publicadas por el Instituto de Evaluación de Tecnologías en Salud e Investigación (IETSI) del Seguro Social del Perú (EsSalud). Las guías IETSI siguen los lineamientos de la guía de profilaxis antibiótica de Reino Unido y de la American Society for Hospital Pharmacist (ASHP).

Se consideró como adherencia aceptable a las prescripciones que tenían como correctos la elección de antibiótico, la dosis y la redosificación y adicionalmente tener como correctos la hora o la duración de la profilaxis; mientras que la adherencia total a todas las cirugías fueron las que cumplían los 5 requisitos completos.

Para el análisis de los datos se utilizó Stata v16 (statacorp). Los estadísticos descriptivos utilizados fueron media, mediana, desviación estándar y percentiles según su distribución para las variables continuas y porcentajes para las variables categóricas. Solo se utilizaron las historias que tuvieran todos los datos completos. Se realizó análisis bivariado para explorar las posibles variables asociadas a la no adherencia total y aceptable. Se utilizó la prueba de chi cuadrado para la comparación de variables categóricas y prueba de U de Mann Whitney en variables cuantitativas no paramétricas. Se predeterminó el nivel de significancia estadística de $p < 0,05$.

El proyecto fue aprobado por el Comité de ética e investigación de la Universidad Científica del Sur, con número 026-2019. No se requirió consentimiento informado por la naturaleza del estudio al utilizar historias clínicas. El presente artículo corresponde a la tesis para sustentación de grado de maestría en Epidemiología Clínica y Bioestadística por la Universidad Científica del Sur.

Resultados

Durante el tiempo de estudio se recolectaron 529 historias clínicas de pacientes sometidas a cirugías ginecológicas con una mediana de edad de 33 años, siendo la cesárea la cirugía más realizada con el 57,1% de los casos. El antibiótico profiláctico se indicó correctamente en el 55,5% de los casos y la dosis fue correcta en el 31,2%. La adherencia completa a las 5 variables evaluadas fue de solo 3,9% (Tabla 1).

Tabla 1. Características clínicas y de profilaxis de pacientes sometidas a cirugías ginecológicas. (n=529)

Variable	Frecuencia	Porcentaje
Edad		
Mediana (RIQ)	33 (28 - 38)	
Hospital		
EsSalud	308	58.2
Minsa	221	41.8
Comorbilidades		
VIH	1	0.2
Anemia	1	0.2
Diabetes	2	0.3
Hipertensión	4	0.8
No	521	98.5
Cirugía realizada		
Cesárea	302	57.1
Legrado uterino	129	24.4
Histerectomía	55	10.4
Otros	43	8.1
Tipo de procedimiento		
Emergencia	319	60.3
Programado	210	39.7
Tipo de anestesia		
Regional	357	67.5
General	154	29.1
Sedoanalgesia	18	3.4
Duración de cirugía (min)		
Mediana (RIQ)	90 (60 - 130)	
Antibiótico profiláctico correcto		
Si	112	55.5
No	90	44.5
Dosis profiláctica correcta		
Si	63	31.2
No	139	68.8
Hora de administración correcta		

Si	105	51.9
No	97	48.1
Redosificación		
Si	1	6.3
No	15	93.7
Duración correcta de profilaxis		
Si	42	20.8
No	160	79.2
Adherencia aceptable		
Si	52	9.8
No	477	90.2
Adherencia adecuada total		
Si	21	3.9
No	508	96.1

En cuanto a las características de la profilaxis administrada, encontramos que el 94.5% de las pacientes recibieron indicación antimicrobiana y el 38.2% del total correspondían a profilaxis antibiótica. En ambos casos la cefazolina fue el antibiótico más utilizado (Tabla 2).

Tabla 2. Características la administración de antibióticos a pacientes sometidas a cirugías ginecológicas. (n=529)

Indicación de antibióticos		
Si	500	94.5
No	29	5.5
Antibióticos utilizados		
Cefazolina	188	37.6
Ceftriaxona	145	29
Clindamicina	43	8.6
Clindamicina + Gentamicina	34	6.8
Ceftriaxona + Clindamicina	16	3.2
Otros	74	14.8
Esquema de antibióticos indicado		
Único	415	83
Doble	63	12.6
Triple	22	4.4
Profilaxis antibiótica		
Si	202	38.2
No	327	61.8
Antibióticos profilácticos utilizados		
Cefazolina	116	57.4
Ceftriaxona	45	22.3
Cloranfenicol	13	6.4
Gentamicina	12	5.9

Clindamicina	10	4.9
Otros	6	3.1
Esquema de antibióticos profilácticos indicado		
Único	197	97.5
Doble	4	1.9
Triple	1	0.5
Tratamiento antibiótico al alta		
Si	358	67.7
No	171	32.3
Antibióticos al alta		
Cefalexina	224	62.6
Dicloxacilina	21	5.9
Gentamicina	21	5.9
Gentamicina + Ceftriaxona	21	5.9
Ceftriaxona	16	4.5
Clindamicina	12	3.3
Otros	43	11.9
Esquema de antibióticos al alta indicado		
Único	318	88.8
Doble	37	10.4
Triple	3	0.8

Finalmente, al compararse las características de las pacientes con el tipo de adherencia observamos que la cirugía realizada, el tipo de procedimiento y el tipo de anestesia estuvieron relacionados a la adherencia completa mientras que el hospital, la cirugía realizada y el tipo de procedimiento a la adherencia aceptable (Tabla 3).

Tabla 3. Comparación de factores relacionados a adherencia aceptable o completa en pacientes sometidas a cirugías ginecológicas.

	Adherencia aceptable		p	Adherencia completa		p
	Si (%)	No (%)		Si (%)	No (%)	
Edad			0.12#			0.56#
Mediana (RIQ)	30.5 (26 - 37.5)	33 (28 - 38)		35 (30 - 40)	33 (28 - 38)	
Hospital			<0.01			0.21
EsSalud	18 (5.8)	290 (94.2)		15 (4.9)	293 (95.1)	
Minsa	34 (15.4)	187 (84.6)		6 (2.7)	215 (97.3)	
Comorbilidades			0.34*			0.56*
Si	52 (9.9)	469 (90.1)		21 (4.1)	500 (95.9)	
No	0 (0)	8 (100)		0 (0)	8 (100)	
Cirugía realizada			0.04*			0.03*
Cesárea	38 (12.6)	264 (87.4)		11 (3.6)	291 (96.4)	
Legrado uterino	11 (8.5)	118 (91.5)		10 (7.8)	119 (92.2)	
Histerectomía	2 (3.6)	53 (96.4)		0 (0)	55 (100)	

Otros	1 (2.3)	42 (97.7)	0 (0)	43 (100)	
Tipo de procedimiento			0.01		0.02*
Emergencia	40 (12.5)	279 (87.5)	18 (5.6)	301 (94.4)	
Programado	12 (5.7)	198 (94.3)	3 (1.4)	207 (98.6)	
Tipo de anestesia			0.31*		0.04*
Regional	38 (10.6)	319 (89.4)	10 (2.8)	347 (97.2)	
General	14 (9.1)	140 (90.9)	11 (7.1)	143 (92.9)	
Sedoanalgesia	0 (0)	18 (100)	0 (0)	18 (100)	
Duración de cirugía (min)			0.32#		0.08#
Mediana (RIQ)	80 (63.5 - 110)	90 (60 - 135)	75 (45 - 99)	90 (60 - 132.5)	

* Prueba exacta de Fisher

U de Mann Withney

Discusión.

El uso de profilaxis antimicrobiana en cirugías obstétricas y ginecológicas varía bastante según las áreas geográficas, contextos socioeconómicos y culturales. En el presente estudio se encontró que, del total de cirugías, se utilizó antibióticos en el 94.5%, sin embargo, la indicación de profilaxis antibiótica solamente correspondió al 38.2%. Esto es diferente con lo encontrado por Uppendahl y Gil, quienes en sus respectivos estudios encontraron frecuencia de usos de profilaxis por encima del 95% [10,11], incluso menor a lo descrito por Romero, en un contexto latinoamericano, donde el uso general de profilaxis antimicrobiana fue de 69.9% [12]. Es notoria la baja adherencia a profilaxis en el Perú, donde en un estudio latinoamericano de prevalencia puntual de uso de antibióticos, juntamente con México, fueron las de menor adherencia [13].

Se ha demostrado que la publicación y seguimiento de guías de práctica clínica mejoran la adecuada prescripción de profilaxis antimicrobiana en cirugías en los hospitales donde se han implementado [14–16]. Un estudio que evaluaba las prácticas de profilaxis quirúrgica de los cirujanos, encontró que los ginecólogos administraban profilaxis antimicrobiana en tiempo correcto solo el 51.5% de las veces y hasta el 35.5% lo administraba juntamente con la incisión [17], mientras que los anestesiólogos parecían tener adherencias más altas a la profilaxis antimicrobiana en cirugías de tipo cesárea [18]. Bajo estas consideraciones, en la actualidad la mayoría de los hospitales tiene al anestesiólogo como el encargado de administrar profilaxis antimicrobiana.

Mientras que en las cirugías que utilizaron antibióticos de manera general el uso de cefazolina correspondió solo al 37.6% de todas las indicaciones, en los casos que se indicó profilaxis antimicrobiana la cefazolina fue usada en el 57.4%. Un estudio en Jordania encontró que el uso de cefazolina fue del 85.4%, pero en su dosis correcta solo fue el 62.3% [19], mientras que en Latinoamérica el uso de este antibiótico fue también bastante alto [9]. El resto de los antibióticos usados varía según regiones y estudios: ceftriaxona, metronidazol, azitromicina, aminoglucósidos, etc., por lo que su comparación es difícil e innecesaria.

En los casos en los que más de dos antibióticos fueron usados, 17% correspondió en casos de tratamiento, mientras que en la profilaxis esta situación se presentó en solo de 2.5%. Esta es también una ventaja del uso racional y concientizado de la profilaxis antibiótica. Los médicos que prescriben correctamente profilaxis antibiótica, tienden a usar un solo antibiótico.

Alemkere encontró que el 39% de los casos de profilaxis utilizaron combinación de antibióticos [7]. Abubakar encontró combinación redundante en el 99% de los casos, que descendió hasta 76% después de una intervención [2].

Al alta, aun una alta proporción de pacientes seguía utilizando antibióticos. Alexiou encontró que el 15% de ginecólogos indica antibióticos por dos días a más [17]. Del mismo modo, Aulakh y Romero reportaron en sus sendos estudios que el 100% de los pacientes recibieron antibióticos posterior a la cirugía [12,20]. Esta situación es un punto débil de la prescripción de antibióticos en todo el mundo, por lo que los esfuerzos de mejora de prescripción debieran enfocarse en este sobreuso.

La mayor adherencia se encontró en los casos de elección del antibiótico correcto, siendo la menor adherencia en la redosificación y duración de la profilaxis. Del mismo modo, en Israel el 95.6% recibía el antibiótico correcto [21]. Contrariamente, en España se encontró que las causas principales de no cumplimiento fueron el tiempo de inicio y la elección correcta del antibiótico [11]. Estos datos diferentes podrían ser ocasionadas por la presencia de unidades de optimización y control de antibióticos en algunos hospitales.

La adherencia total a los cinco parámetros correctos fue de solo 3,9% del total de cirugías, recordando que solo se incluyeron cirugías limpias y limpias contaminadas, por lo que todos debieron utilizar profilaxis y no tratamiento antibiótico. Del mismo modo, al considerar la adecuada elección de antibiótico y su dosis, más la presencia de un correcto adicional, la adherencia aceptable es solo del 9.8%. Abdel y Cols encontraron que la adherencia general fue de solo 2.7% del total de cirugías [19]. Una cohorte de más de 400000 casos en estados unidos se encontró que la adherencia antibiótica fue de 35.9% [22].

El tipo de cirugía estuvo asociada estadísticamente tanto a la adherencia total, como aceptable, siendo mejor en las cesáreas, que en el resto de las cirugías. Esto es congruente con lo encontrado por Uppendahl, quien describe que los procedimientos de miomectomía, laparoscopia y embarazo ectópico recibieron agentes contrarios a lo recomendado hasta en 96% [10]. Tietel encuentra una adherencia por encima del 90% en cesáreas [21]. Kremer, por otro lado encuentra que en cirugías que se necesitó entrar a cavidad abdominal la adherencia adecuada a la profilaxis antimicrobiana desciende significativamente [4].

Existe mayor adherencia a las guías de profilaxis en las cirugías de emergencias que en aquellas programadas, lo cual también fue encontrado por Abubakar, mostrando administración correcta en cirugías de emergencia [1]. Esto difiere a lo encontrado en Jordania, donde encontraron que las cirugías de emergencia tenían mayor riesgo de continuar la terapia antibiótica [19] o en Estados unidos, donde el uso inadecuado de profilaxis fue mayor en cirugías de emergencia [22].

En cuanto al tipo de anestesia hubo diferencias estadísticas, siendo mejor en las anestias generales. Esto difiere a lo mostrado por Polla donde la anestesia local tenía mayor probabilidad de recibir adecuada PA [23].

El hospital de procedencia fue diferente estadísticamente únicamente en la adherencia aceptable, no para adherencia total. Brubaker encontró que hubo diferencias geográficas en la posibilidad de recibir antibióticos correctos [3], al igual que Hamdaoui en el caso de profilaxis para abortos, encontrando que a mayor número de procedimientos, mayor proporción de PA [24].

El estudio presenta varias limitaciones. La baja proporción de casos con una adherencia adecuada podría afectar los resultados estadísticos. Esto ha podido resolverse al menos en parte por la clasificación en adherencia completa y aceptable, lo cual ha posibilitado tener resultados coherentes entre los factores asociados a la adherencia. Algunos grupos de los factores relacionados tiene poca cantidad de datos, lo cual afecta la extrapolación de estos resultados hacia la población general. Una limitación importante radica en el tipo de muestreo no probabilístico que se realizó en el presente estudio, lo cual afecta importantemente la posibilidad de extrapolación a la población objetivo.

Concluimos que la PA en dos hospitales de Huánuco son inadecuadas y los procedimientos tienen baja adherencia a las guías de práctica clínica institucional. Las cesáreas y cirugías de emergencia están relacionados estadísticamente con mejor prescripción de profilaxis antibiótica.

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ANEXOS



antibiotics



Article

Compliance with Antibiotic Prophylaxis in Obstetric and Gynecological Surgeries in Two Peruvian Hospitals

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Abstract: Introduction: Surgical site infections (SSI) can be as high in gynecology and obstetrics surgeries compared to other areas. Antimicrobial prophylaxis is an effective tool in the prevention of SSIs; however, it is often not adequately administered, so this study aimed to understand the compliance and factors associated with the use of the clinical practice guidelines for antibiotic prophylaxis in gynecological surgeries in two hospitals in the city of Huanuco, Peru. Methods: An analytical cross-sectional study of all gynecologic surgeries performed during 2019 was performed. Compliance was determined based on the antibiotic chosen, dose, administration time, redosing, and prophylaxis duration. Age, hospital of origin, presence of comorbidities, surgery performed, as well as its duration, types of surgery, and anesthesia were considered as related factors. Results: We collected 529 medical records of patients undergoing gynecological surgery with a median age of 33 years. The prophylactic antibiotic was correctly indicated in 55.5% of cases, and the dose was correct in 31.2%. Total compliance with the five variables evaluated was only 3.9%. Cefazolin was the most commonly used antibiotic. Conclusion: Low compliance with the institutional clinical practice guidelines for antibiotic prophylaxis was identified, showing that antimicrobial prophylaxis in the hospitals studied was inadequate.

Keywords: compliance; antibiotics; surgical site infections; prophylaxis; gynecologic surgeries

1. Introduction

Surgical site infections (SSIs) are the most frequent nosocomial infections in developing countries [1,2]. SSIs pose a significant burden in terms of morbidity, mortality, and hospital costs. Patients who develop an SSI have a twofold increased risk of death and up to a 6-fold increased chance of readmission after discharge, as well as a twofold increased risk of admission to intensive care, with a concomitant risk of prolonged hospital stay [3].

SSIs are a major source of healthcare expenditure in the Region of the Americas, with estimates suggesting that they cost between USD 3.5 and 10 billion annually. In addition to

the direct costs of treatment, SSIs also result in approximately 90,000 readmissions each year, incurring an additional cost of USD 700 million [4].

It has been described that cesarean delivery is associated with a 20 times higher risk of infection compared to vaginal delivery, with a rate of infection reported to be 1–25% [5] in developed countries and an estimated 10–48% of women delivering via cesarean in Sub-Saharan Africa [6]. These surgeries are complicated by SSIs, endometritis, and urinary tract infections if prophylactic antibiotics are not used [7]. Of the total number of gynecological surgeries, SSIs may develop in up to 10% of cases [8]. The incidence of SSI can be as high in procedures performed in gynecology and obstetrics when compared to other areas [1,9,10].

Antibiotic prophylaxis is defined as a brief course of antibiotic use initiated close to the surgical procedure and aimed at reducing the likelihood of developing SSIs [11]. Antibiotic prophylaxis is aimed at obtaining bactericidal levels in the tissue at the time of the incision and at reducing the bacterial load intraoperatively [12]. Although antibiotic prophylaxis has proven to be an effective tool in preventing SSIs, in Peru and many other countries, its use is not regulated [13]. In hospitals with procedural guidelines, medical prescribers often do not follow them adequately.

Compliance with clinical practice guidelines is crucial for ensuring the appropriate and effective use of antibiotics. These guidelines offer recommendations for the selection, timing, and duration of antibiotic prophylaxis based on patient characteristics and the surgical procedure [14]. However, reports have shown that broader spectrum antibiotics, unnecessary combinations of antibiotics, suboptimal timing, and prolonged duration of surgical antibiotic prophylaxis are being used [3].

Mistakes in the administration of antibiotic prophylaxis are common, with errors such as delayed initiation of antibiotics after the incision or even after the entire surgical procedure, use of antibiotics not recommended for a specific surgery, and inadequate dosing being reported. Patients admitted to gynecology and obstetrics wards are at higher risk of not receiving appropriate antibiotic prophylaxis for more than 24 h [11].

The inappropriate use of antibiotic prophylaxis and the overuse of antibiotics have resulted in numerous negative outcomes, including increased adverse reactions, hospital cost overruns, bacterial resistance, and superinfections [12]. The World Health Organization (WHO) has identified antibiotic resistance as one of the top ten global public health threats facing humanity today [15]. Non-compliance with the appropriate use of antibiotics can be caused by various factors, including lack of awareness, knowledge gaps, misperceptions, cultural or institutional barriers, and competing priorities. For these reasons, it is essential to promote the rational and efficient use of antimicrobials to ensure their appropriate use [16].

Enhancing compliance with clinical practice guidelines for antibiotic prophylaxis is a crucial strategy for reducing the inappropriate use of antibiotics. To address incorrect use, it is essential to judiciously follow the clinical practice guidelines that have already been published by various societies and institutions. By promoting adherence to established guidelines, healthcare providers can ensure that antibiotics are used appropriately and in the best interests of patient health [17,18].

The purpose of this study was to assess compliance with the American Society for Hospital Pharmacists (ASHP) clinical practice guidelines for antibiotic prophylaxis published in 2010 in two hospitals located in Huanuco, Peru. Additionally, we aimed to identify factors associated with compliance in these settings.

2. Results

During the study period, 529 medical records were collected from patients who underwent gynecological surgery with a median age of 33 years, the cesarean section being the most frequently performed surgery in 57.1% of the cases. The prophylactic antibiotic was correctly indicated in 55.5% of cases, and the dose was correct in 31.2%. Complete compliance with the five variables evaluated was only 3.9% (Table 1).

Table 1. Clinical and prophylaxis characteristics of patients undergoing gynecological surgeries (n = 529).

Characteristics	Frequency	Percentage
Age		
Median (IQR)	33 (28–38)	
Hospital		
EsSalud	308	58.2
Minsa	221	41.8
Comorbidities		
HIV	1	0.2
Anemia	1	0.2
Diabetes	2	0.3
Hypertension	4	0.8
No	521	98.5
Surgery		
Cesarean	302	57.1
Uterine curettage	129	24.4
Hysterectomy	55	10.4
Others	43	8.1
Type of procedure		
Emergency	319	60.3
Programmed	210	39.7
Anesthesia type		
Regional	357	67.5
General	154	29.1
Sedoanalgesia	18	3.4
Length of surgery (min)		
Median (IQR)	90 (60–130)	
Correct prophylactic antibiotic		
Yes	112	55.5
No	90	44.5
Correct prophylactic dose		
Yes	63	31.2
No	139	68.8
Time of proper administration		
Yes	105	51.9
No	97	48.1
Redosing		
Yes	1	6.3
No	15	93.7
Correct length of prophylaxis		
Yes	42	20.8
No	160	79.2
Acceptable compliance		
Yes	52	9.8
No	477	90.2
Total compliance		
Yes	21	3.9
No	508	96.1

With regards to the prophylaxis administered, our findings reveal that 94.5% of patients were prescribed antibiotics, with 38.2% receiving antibiotic prophylaxis. Cefazolin was the most frequently used antibiotic in both cases (Table 2).

Table 2. Characteristics of antibiotic administration to patients undergoing gynecological surgeries (n = 529).

Antibiotic Indication		
Yes	500	94.5
No	29	5.5
Antibiotics used		
Cefazoline	188	37.6
Ceftriaxone	145	29
Clindamycin	43	8.6
Clindamycin + Gentamicin	34	6.8
Ceftriaxone + Clindamycin	16	3.2
Ceftriaxone + Clindamycin + Gentamicin	13	2.6
Ceftriaxone + Gentamicin	6	1.2
Cefalexin	6	1.2
Cefazolin + Gentamicin	3	0.6
Cefazolin + Gentamicin + Chloramphenicol	3	0.6
Ciprofloxacin	3	0.6
Others	40	8
Antibiotic regimen indicated		
Single	415	83
Double	63	12.6
Triple	22	4.4
Antibiotic prophylaxis		
Yes	202	38.2
No	327	61.8
Prophylactic antibiotics used		
Cefazolin	116	57.4
Ceftriaxone	45	22.3
Chloramphenicol	13	6.4
Gentamicin	12	5.9
Clindamycin	10	4.9
Others	6	3.1
Indicated prophylactic antibiotic regimen		
Single	197	97.5
Double	4	1.9
Triple	1	0.5
Antibiotic treatment at discharge		
Yes	358	67.7
No	171	32.3
Antibiotics indicated at discharge		
Cefalexin	224	62.6
Dicloxacillin	21	5.9
Gentamicin	21	5.9
Gentamicin + Ceftriaxone	21	5.9
Ceftriaxone	16	4.5
Clindamycin	12	3.3
Others	43	11.9
Indicated discharge antibiotic regimen		
Single	318	88.8
Double	37	10.4
Triple	3	0.8

Finally, when comparing patient characteristics with the type of compliance, we observed that the surgery performed, the type of procedure, and the type of anesthesia were related to total compliance, while the hospital, the surgery performed, and the type of procedure to acceptable compliance (Table 3).

Table 3. Comparison of factors related to acceptable or total compliance in patients undergoing gynecologic surgery.

	Acceptable Compliance		p	Total Compliance		p
	Si (%)	No (%)		Si (%)	No (%)	
Age			0.12			0.56
Median (IQR)	30.5 (26–37.5)	33 (28–38)		35 (30–40)	33 (28–38)	
Hospital			<0.01			0.21
EsSalud	18 (5.8)	290 (94.2)		15 (4.9)	293 (95.1)	
Minsa	34 (15.4)	187 (84.6)		6 (2.7)	215 (97.3)	
Comorbidities			0.34			0.56
Si	52 (9.9)	469 (90.1)		21 (4.1)	500 (95.9)	
No	0 (0)	8 (100)		0 (0)	8 (100)	
Surgery			0.04			0.03
Cesarean	38 (12.6)	264 (87.4)		11 (3.6)	291 (96.4)	
Uterine curettage	11 (8.5)	118 (91.5)		10 (7.8)	119 (92.2)	
Hysterectomy	2 (3.6)	53 (96.4)		0 (0)	55 (100)	
Others	1 (2.3)	42 (97.7)		0 (0)	43 (100)	
Type of procedure			0.01			0.02
Emergency	40 (12.5)	279 (87.5)		18 (5.6)	301 (94.4)	
Programmed	12 (5.7)	198 (94.3)		3 (1.4)	207 (98.6)	
Anesthesia type			0.31			0.04
Regional	38 (10.6)	319 (89.4)		10 (2.8)	347 (97.2)	
General	14 (9.1)	140 (90.9)		11 (7.1)	143 (92.9)	
Sedoanalgesia	0 (0)	18 (100)		0 (0)	18 (100)	
Length of surgery (min)			0.32			0.08
Median (IQR)	80 (63.5–110)	90 (60–135)		75 (45–99)	90 (60–132.5)	

3. Discussion

The use of antimicrobial prophylaxis in obstetric and gynecologic surgeries varies considerably according to geographical areas and socioeconomic and cultural contexts. The present study found that, of the total number of surgeries, antibiotics were used in 94.5%; however, the indication for antibiotic prophylaxis only corresponded to 38.2%. This is different from what was found by Uppendahl and Gil, who, in their respective studies, found a frequency of use of prophylaxis above 95% [19,20], even lower than that described by Romero, in a Latin American context, where the overall use of antimicrobial prophylaxis was 69.9% [13]. The low adherence to prophylaxis in Peru is notorious. In a Latin American study of point prevalence of antibiotic use, Peru together with Mexico were the countries with the lowest adherence [21].

It has been shown that the publication and follow-up of clinical practice guidelines improve the proper prescription of antimicrobial prophylaxis in surgery in hospitals where they have been implemented [22–24]. A study evaluating surgeons' surgical prophylaxis practices found that gynecologists administered antimicrobial prophylaxis at the correct time only 51.5% of the time, and up to 35.5% administered it together with the incision [25]. At the same time, anesthesiologists appeared to adhere more to antimicrobial prophylaxis in cesarean-type surgeries [26]. Under these considerations, most hospitals now have an anesthesiologist administering antimicrobial prophylaxis.

While in surgeries that used antibiotics in general, cefazolin corresponded to only 37.6% of all indications; in cases where antimicrobial prophylaxis was indicated, cefazolin was used in 57.4%. A study in Jordan found that cefazolin was 85.4%, but in its correct dose, it was only 62.3% [27], while in Latin America, the use of this antibiotic was also relatively high [17]. The rest of the antibiotics used vary according to regions and studies: ceftriaxone, metronidazole, azithromycin, aminoglycosides, etc., making their comparison difficult and unnecessary.

The present study has shown that the use of multiple antibiotics was more frequent in cases of treatment compared to prophylaxis. Specifically, 17% of cases involved the use of more than two antibiotics in treatment, while only 2.5% did so in prophylaxis. This finding highlights the importance of rational and conscientious antibiotic prophylaxis. Physicians who correctly prescribe antibiotic prophylaxis tend to use only one antibiotic, which is a

significant advantage. However, previous studies have shown that antibiotic combination is still prevalent in some cases of prophylaxis, with Alemkere reporting that 39% of prophylaxis cases used antibiotic combinations [11]. In another study, Abubakar found redundant combinations in 99% of cases, which decreased to 76% after educative intervention [3]. The high proportion of antibiotic combinations (such as Clindamycin + Gentamicin or Ceftriaxone + Clindamycin) may stem from a fear of multiple bacterial etiologies causing SSIs. However, some combinations (such as Ceftriaxone + Clindamycin + Gentamicin, Ceftriaxone + Gentamicin, Cefazolin + Gentamicin, or Cefazolin + Gentamicin + Chloramphenicol) have similar coverage without an adequate rationale for their use.

Even after discharge, a significant proportion of patients were found to continue using antibiotics. Alexiou's research showed that 15% of gynecologists prescribed antibiotic prophylaxis for two days or more [25], while Aulakh and Romero's studies reported that 100% of patients received antibiotics after surgery [13,28]. The overuse of antibiotics is a global concern, and efforts to improve prescribing practices should focus on reducing this unnecessarily prolonged use. These practices not only contribute to the growing problem of antibiotic resistance but also increase the risk of adverse effects and unnecessary healthcare costs.

The study revealed that the highest frequency of compliance was observed in the choice of the right antibiotic, while the lowest frequencies of compliance were observed in relation to redosing and duration of prophylaxis. A study in Israel showed that 95.6% of patients received the correct antibiotic [29]. In contrast, a study in Spain identified the timing of initiation and correct antibiotic selection as the main causes of non-compliance [20]. Importantly, differences in compliance rates could be attributed to the presence of antibiotic optimization and monitoring units in some hospitals. These units are not present in either of the two hospitals studied.

The study's findings regarding compliance with prophylaxis protocols in surgical patients are concerning. Total compliance with all five correct parameters was found to be only 3.9%, despite the fact that only clean and clean-contaminated surgeries were included in the analysis—all of which should have received prophylaxis instead of antibiotic treatment. When considering the appropriate choice of antibiotic and dose, as well as an additional correct parameter, acceptable compliance rates only reached 9.8%. These results are consistent with those of previous studies. Abdel et al. reported overall adherence of only 2.7% in all surgeries [27]. In a large cohort study of over 400,000 cases in the United States, antibiotic adherence was found to be only 35.9% [30].

The study found that the type of surgery was a statistically significant factor associated with both total and acceptable compliance, with cesarean sections showing better adherence to prophylaxis protocols compared to other types of surgeries. These findings are consistent with those of previous studies. For example, Uppendahl reported that myomectomy, laparoscopy, and ectopic pregnancy procedures received agents that were contrary to recommendations in up to 96% of cases [19]. In contrast, Tietel found that adherence to prophylaxis protocols was over 90% in cesarean sections [29]. Kremer, on the other hand, found that adequate adherence to antimicrobial prophylaxis decreased significantly [8]. These results highlight the importance of considering the type of surgery when designing interventions to improve compliance with prophylaxis protocols. Cesarean sections, in particular, may require less specific attention due to their higher compliance rates compared to other types of surgeries.

The results indicate that there is a higher level of adherence to prophylaxis guidelines in emergency surgeries compared to scheduled surgeries. This is supported by Abubakar's study, which demonstrates that the correct administration of prophylaxis is more frequent in emergency surgeries [1]. However, this finding is not consistent across all studies. For example, research conducted in Jordan has shown that emergency surgeries carry a greater risk of prolonged antibiotic therapy [27], while inadequate use of prophylaxis is more prevalent in emergency surgeries in the United States [30]. Despite some variability in the use of prophylaxis guidelines in emergency surgeries across different regions, the evidence

suggests that compliance is generally higher in emergency surgeries than in scheduled surgeries.

There were statistical differences regarding the type of anesthesia, being better in general anesthetics. This differs from that shown by Polla, where local anesthesia was more likely to receive adequate antibiotic prophylaxis [31]. These differing results suggest the need for further research to better understand the relationship between the type of anesthesia and antibiotic prophylaxis in order to optimize patient outcomes.

The hospital of origin was found to have statistical differences only for acceptable compliance but not for total compliance. Previous studies, such as Brubaker's, have found geographic differences in the likelihood of receiving the correct antibiotics, while Hamdaoui found that the proportion of antibiotic prophylaxis increased with the number of procedures, particularly in the case of abortion prophylaxis [7,32]. These results suggest that even factors as little considered as hospital and geographic location may influence compliance with antibiotic prophylaxis guidelines.

The present study has certain limitations that must be pointed out. First, the statistical results may be affected due to the low proportion of cases with adequate compliance. However, this was partly mitigated by categorizing compliance as complete or acceptable, resulting in consistent results among factors associated with compliance. Second, limited data on certain groups of related factors may restrict the generalizability of these findings to the broader population. Moreover, the study did not consider variations in surgical techniques or practices among surgeons, which could also affect compliance rates, nor the presence of pre-eclampsia or HELLP syndrome, which, although they do not usually require antibiotics beyond prophylaxis, patients with these conditions tend to have longer hospital stays, increasing the risk of iatrogenic infections and the need for antibiotic treatment. Finally, the study was conducted in only two institutions, which could limit the applicability of the findings to other healthcare settings or regions.

4. Materials and Methods

An analytical cross-sectional study with retrospective data was conducted in the gynecology and obstetrics services of all surgeries that received antimicrobial prophylaxis. Antimicrobial prophylaxis was defined as the use of antibiotics before surgery to prevent infections associated with the surgical site. Age, hospital of origin, presence of comorbidities, type of surgery performed, duration of surgery, types of surgery, and anesthesia were all considered as related factors for analysis. Elective and emergency procedures were included.

Data collection was performed in the gynecology and obstetrics services of the two leading hospitals of the city of Huánuco "Hospital Regional Hermilio Valdizan" and "Hospital II EsSalud-Huanuco" from 1 January to 31 December 2019. The selected hospitals serve as a point of reference for the entire region of Huanuco, offering gynecology and obstetrics services to a population of 375,000 women with over 80 available beds.

The data collection process was carried out over a period of four months, from January to April 2022, during which all medical records and operative reports from both hospitals were reviewed. However, to ensure the validity of the study, certain patients were excluded from the analysis. Specifically, those who had previously used antibiotics during hospitalization or undergone surgery within the preceding three months were excluded, as these factors may have influenced the use of antimicrobials not recommended for antibiotic prophylaxis. In addition, procedures performed on individuals with severe immunosuppression, those who had been hospitalized for more than 48 h at the time of the procedure, individuals with suspected or confirmed colonization by resistant microorganisms, and those surgical histories and reports that did not present complete data related to prophylaxis were also excluded from the analysis.

The investigators followed the U.S. Center for Disease Control (CDC) wound classification to include only clean and clean-contaminated wounds: Class I/Clean wounds are those which are uninfected and do not encounter any inflammation. Additionally, these

wounds do not enter the respiratory, alimentary, genital, or uninfected urinary tract. Clean wounds are typically closed and, if needed, drained with closed drainage. If operative incisional wounds are a result of non-penetration (blunt) trauma and meet the criteria, they should be included in this category. Class II/Clean-contaminated wounds refer to operative wounds where the respiratory, alimentary, genital, or urinary tracts are entered under controlled conditions, and there is no unusual contamination. This category includes operations that involve the biliary tract appendix, vagina, and oropharynx, provided there is no evidence of infection or a significant breach in technique.

All parameters were evaluated individually, according to the Guide for Surgical Prophylaxis published by the Institute for the Evaluation of Health Technologies and Research (IETSI) of the Peruvian Social Security (EsSalud). The IETSI guidelines follow the antibiotic prophylaxis guidelines of the United Kingdom and the American Society for Hospital Pharmacists (ASHP).

The study established the following parameters:

- Antibiotic type: this was deemed correct if the antibiotics used were recommended by prophylaxis guidelines and incorrect if any other antibiotic was administered;
- Appropriate dose: the dose was classified as correct if it corresponded to the dosage recommended by the prophylaxis guidelines and incorrect if any other dosage was indicated;
- Time of administration: this parameter was considered correct if the antibiotic was administered within 60 min prior to the incision and incorrect if it was administered beyond 60 min or after the incision;
- Duration of prophylaxis: the prophylaxis duration was deemed correct if the antibiotic was stopped on the same day of the surgery and incorrect if the antibiotic continued to be administered in the following days;
- Need for redosing: considered as correct to the administration of an additional dose of antibiotic during a surgical procedure when the procedure is prolonged beyond the recommended duration for the chosen antibiotic and was considered incorrect if the antibiotic was not re-administered or was administered before the recommended time.

For the purposes of the study, acceptable compliance was defined as prescriptions that adhered to the correct choice of antibiotic, appropriate dosage and redosing, and adherence to the recommended time or duration of prophylaxis. Meanwhile, total compliance was achieved when all five requirements were met for every surgery.

Stata v16 (StataCorp) was used for data analysis. The descriptive statistics used were mean, median, standard deviation, and percentiles according to their distribution for continuous variables and percentages for categorical variables. Only histories with complete data were used. Bivariate analysis was performed to explore the possible variables associated with total and acceptable compliance. The chi-square test was used to compare categorical variables, and the Mann–Whitney U test was used for nonparametric quantitative variables. The statistical significance level of $p < 0.05$ was predetermined.

This research was conducted in accordance with the ethical principles emanating from the regulatory standards for human health research and the Declaration of Helsinki of the World Medical Association and all its amendments. The Universidad Científica del Sur, through Research Ethics Committee, granted approval for the project, identified as number 026-2019. As the study relied on medical records, obtaining informed consent was not deemed necessary. This article represents the thesis submitted for a master's degree in clinical epidemiology and biostatistics at the Universidad Científica del Sur.

5. Conclusions

We conclude that antibiotic prophylaxis in gynecological surgeries in two hospitals in Huánuco is inadequate, and procedures have low compliance with institutional clinical practice guidelines. Cesarean sections and emergency surgeries are statistically related to better antibiotic prophylaxis prescriptions.

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Conflicts of Interest: The authors declare no conflict of interest.

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2. Ficha de recolección de datos

FICHA N°	
SERVICIO	
FECHA DE CIRUGIA	
CIRUJANO PRINCIPAL	
EDAD DEL CIRUJANO	
AÑO DE GRADUACION	
AÑO DE ESPECIALIDAD	
CIRUJANO ASISTENTE	
EDAD DEL CIRUJANO	
AÑO DE GRADUACION	
AÑO DE ESPECIALIDAD	
ANESTESIOLOGO	
EDAD DEL ANESTESIOLOGO	
AÑO DE GRADUACION	
AÑO DE ESPECIALIDAD	
PACIENTE	
EDAD DEL PACIENTE	
SEXO DEL PACIENTE	
DIAGNOSTICO QUIRURGICO DE INGRESO	
COMORBILIDADES	
CIRUGIA PROGRAMADA	
TIPO DE CIRUGIA	PROGRAMADA
	EMERGENCIA
TIPO DE ANESTESIA	
ANESTESICO UTILIZADO	
DIAGNOSTICO PREOPERATORIO	
DIAGNOSTICO POSTOPERATORIO	
CIRUGIA REALIZADA	
HORA/MINUTO DE INICIO DE ANESTESIA	
HORA/MINUTO DE INICIO DE INCISION	
HORA/MINUTO DE CIERRE DE INCISION	
HORA/MINUTO DE TERMINO DE CIRUGIA	
DURACION TOTAL DE LA CIRUGIA EN MINUTOS	
TIPO DE HERIDA REALIZADA	LIMPIA

	LIMPIA-CONTAMINADA
USO DE PROFILAXIS ANTIBIOTICA	SI
	NO
ANTIBIOTICO UTILIZADO	DOSIS UTILIZADA
HORA/MINUTO DE ADMINISTRACION	
DOSIS DE REFUERZO	SI
	NO
HORA/MINUTO ADMINISTRACION DOSIS DE REFUERZO	
INFECCION DE SITIO QUIRURGICO	SI
	NO
FECHA DE DIAGNOSTICO DE ISQ	
ADMINISTRACION DE ANTIBIOTICOS POST OPERATORIOS	SI
	NO
ANTIBIOTICO UTILIZADO PARA TRATAMIENTO	DOSIS UTILIZADA PARA TRATAMIENTO
FECHA DE ULTIMA DOSIS ADMINISTRADA	
DIAS DE TRATAMIENTO ANTIBIOTICO	
ANTIBIOTICO INDICADO AL ALTA	DOSIS INDICADA

COMITÉ INSTITUCIONAL DE ÉTICA EN INVESTIGACIÓN



CONSTANCIA N° 205-CIEI-CIENTÍFICA-2019

El presidente del Comité Institucional de Ética en Investigación de la Universidad Científica del Sur (CIEI-CIENTÍFICA) da constancia que el proyecto de investigación, cuyos datos se registran a continuación, ha sido **aprobado** por el CIEI-CIENTÍFICA.



Código de registro: **477-2019-POS15**
 Título: **Adherencia a profilaxis quirúrgica en cirugías obstétricas y ginecológicas en dos hospitales de Huánuco**
 Investigador(a): **Franz Kovy Arteaga Livias**

La aprobación del proyecto de investigación implica que el documento presentado a evaluación cumple con los lineamientos de Universidad en materia de investigación y ética, los cuales se sustentan en la normativa internacional vigente.

En tal sentido, esta aprobación carecerá de valor si es que el proyecto de investigación arriba indicado es modificado de cualquier forma. Toda enmienda, añadido, eliminación o eventualidad (eventos adversos, etc.) posterior a la fecha de aprobación debe ser reportado al CIEI-CIENTÍFICA.

La vigencia de la aprobación de este documento es de dieciocho (18) meses (**hasta el 15 de abril del 2021**), periodo en el que puede desarrollarse el proyecto. Cualquier trámite para su renovación deberá ser enviado antes del término de la vigencia de este documento, debiendo suspenderse todo desarrollo hasta que la renovación sea aprobada.

Villa El Salvador, 16 de octubre de 2019



 Méd. Fernando M. Runzer Colmenares
 Presidente
 Comité Institucional de Ética en Investigación

COMITÉ INSTITUCIONAL DE ÉTICA EN
INVESTIGACIÓN**Constancia**

Luego de la revisión de la solicitud, el presidente del Comité Institucional de Ética en Investigación de la Universidad Científica del Sur (CIEI-CIENTÍFICA) hace constar que el CIE-CIENTÍFICA ha aprobado de forma expedita la **enmienda/modificación** del proyecto de investigación que se detalla continuación:

Código de registro: **477-2019-POS15**

Título: **Adherencia a profilaxis quirúrgica en cirugías obstétricas y ginecológicas en dos hospitales de Huánuco**

Investigador(es): **Franz Kovy Arteaga Livias**

Documentos vinculados: **Constancia N° 205-CIEI-CIENTÍFICA-2019**

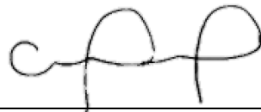
Periodo de aprobación: **16/10/2019 al 15/04/2021**

La **enmienda/modificación** corresponde a los siguiente:

1. Proyecto de investigación, versión recibida el día 19 de enero del 2023. Se detalla lo siguientes cambios:
 - a. **Renovación de vigencia del periodo de aprobación ética.** Vista la solicitud, se da la renovación de la aprobación ética, que tiene vigencia desde el 27 de enero del 2023 al 26 de julio del 2023. El proyecto solo podrá ejecutarse entre los periodos detallado tanto en la constancia 205-CIEI-CIENTÍFICA-2019 como en esta enmienda.
 - b. **Cambio en el cronograma en el estudio.**

Todas las demás características de la investigación descritas en el proyecto original permanecen; por lo que cualquier otra modificación deberá informarse a este Comité, para su evaluación.

Lima, 27 de enero de 2023



Mg. Cinthya Ruth Chipana Herquinio
Presidente
Comité Institucional de Ética en Investigación

RESOLUCIÓN DIRECTORAL ACADÉMICA DE CARRERA No. 230 - DACMH-DAFCS-U. CIENTÍFICA-2020

Lima, 15 de abril del 2020

VISTO:

El informe de revisión independiente académica y la aprobación de un Comité de Ética del proyecto de tesis titulado: **“ADHERENCIA A PROFILAXIS QUIRÚRGICA EN CIRUGÍAS OBSTETRICAS Y GINECOLÓGICAS EN DOS HOSPITALES DE HUÁNUCO”**.

CONSIDERANDO:

Que, de acuerdo al Reglamento General de la Universidad Científica del Sur y el reglamento y Procedimientos de trabajos de Investigación para obtener el **Grado de Maestro en Epidemiología Clínica y Bioestadística**.

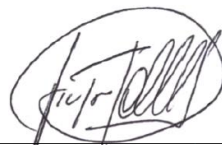
Que, de acuerdo a la normativa vigente de la Universidad Científica del Sur, en uso de las atribuciones conferidas al Director Académico de la Carrera.

SE RESUELVE:

ART. 1° Aprobar e inscribir el proyecto de tesis titulado: **“ADHERENCIA A PROFILAXIS QUIRÚRGICA EN CIRUGÍAS OBSTETRICAS Y GINECOLÓGICAS EN DOS HOSPITALES DE HUÁNUCO”**, presentado por el alumno **FRANZ KOVY ARTEAGA LIVIAS**, con N° de registro: **477-2019-POS15**.

ART. 2° Nombrar al docente **Mg. Oscar Guillermo Flores Flores**, como asesor para el desarrollo de la tesis en cuestión.

Regístrese, comuníquese y archívese.



MC. VICTOR VALLEJO SANDOVAL
Director Académico (e)
Carrera de Medicina Humana

c.c. Archivo

RESOLUCIÓN DIRECTORAL ACADÉMICA DE CARRERA No. 108 - DACMH-DAFCS-U. CIENTIFICA-2023

Lima, 09 de febrero del 2023

VISTO:

El informe de revisión independiente académica y la aprobación de un Comité de Ética del proyecto de investigación titulado: **"ADHERENCIA A PROFILAXIS QUIRÚRGICA EN CIRUGÍAS OBSTETRICAS Y GINECOLÓGICAS EN DOS HOSPITALES DE HUÁNUCO"**.

CONSIDERANDO:

Que, de acuerdo al Reglamento General de la Universidad Científica del Sur y el reglamento y Procedimientos de trabajos de Investigación para obtener el **Grado de Maestro**.

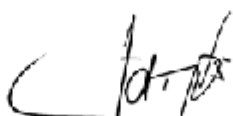
Que, de acuerdo a la normativa vigente de la Universidad Científica del Sur, en uso de las atribuciones conferidas al Director Académico de la Carrera.

SE RESUELVE:

ART. 1° Aprobar, en vías de regularización e inscribir el proyecto de tesis titulado **"ADHERENCIA A PROFILAXIS QUIRÚRGICA EN CIRUGÍAS OBSTETRICAS Y GINECOLÓGICAS EN DOS HOSPITALES DE HUÁNUCO"**, presentado por el alumno Franz Kovy Arteaga Livias con N° de registro: **477-2019-POS15**.

ART. 2° Nombrar al Docente Oscar Flores Flores como asesor para el desarrollo de la tesis en cuestión.

Regístrese, comuníquese y archívese.


Mg. JORDI GRAU MONGE
Director Académico (e)
Carrera de Medicina Humana