ORIGINAL ARTICLE

HEALTHCARE ASSOCIATED INFECTION AFTER LEGAL INDUCED ABORTIONS IN UKRAINE: RESULTS A MULTICENTER STUDY

DOI: 10.36740/WLek202107103

Aidyn G. Salmanov[1], Serhiy M. Baksheev[1,2], Dmytro V. Kuflovskyi[1,2], Liudmyla V. Manzhula[1,2], Oleksandr A. Voloshyn[1,3], Svitlana M. Korniyenko[4], Oleh I. Tsyhanenko[5]

[1]SHUPYK NATIONAL HEALTHCARE UNIVERSITY OF UKRAINE, KYIV, UKRAINE
[2]KYIV CITY MATERNITY HOSPITAL, KYIV, UKRAINE
[3]KYIV REGIONAL MATERNITY HOSPITAL, KYIV, UKRAINE
[4]ODESA NATIONAL MEDICAL UNIVERSITY, ODESA, UKRAINE
[5]NATIONAL UNIVERSITY OF UKRAINE ON PHYSICAL EDUCATION AND SPORT, KYIV, UKRAINE

ABSTRACT

The aim: To determine trend of legal induced surgical abortion and to assess the frequency of infection complications after termination of pregnancy in Ukraine.

Materials and methods: We conducted a prospective multicentre cohort study was based on surveillance data of healthcare-associated infection (HAI) after legal induced surgical abortion in women's from January 2017 to 2019 in Ukraine. Definitions of HAI after induced abortion were used from the CDC/ NHSN.

Results: The number of surgical abortions in Ukraine increased by 32.8%. A total of 25.9% HAIs were identified after surgical abortion. Of these HAIs, 25.9 were Endometritis, 21.8% Bacterial Vaginitis, 14.3% Parametritis, 13.1% Cervicitis, 9.9% Adnexa utery, 7.8% Salpingitis, 6.3% Chorioamnionitis, and 0.9% other reproductive tract infections. *E.coli* were most commonly reported, accounting for 25.9% of all organisms, followed by *Enterococcus* spp. (16.2%), *Staphylococcus aureus* (15.5%), *P. aeruginosa (*10.9%), and *Enterobacter* spp. (10.1%). Antimicrobial resistance in the isolates associated with HAIs showed, among the gram-positive bacteria, that 19.1% and 3.6% of coagulase-negative staphylococci isolates were b-lactam (oxacillin) – and glycopeptide-resistant, respectively. Meticillin resistance was reported in 23.2% of S aureus isolates. Vancomycin resistance was reported in 3.7% of isolated enterococci. Among the gram-negative bacteria, third-generation cephalosporins resistance was found in 33.1% of Klebsiella spp and in 24.1% of *E.coli* isolates.

Conclusions: The results of this study revealed high rates of HAIs after surgical abortion and most causing pathogens were associated with resistant to antibiotic strains. This knowledge is essential to develop targeted strategies to surveillance and reduce the incidence of post-abortion infections.

KEY WORDS: induced surgical abortion, healthcare-associated infection, pathogens, antimicrobial resistance, Ukraine

Wiad Lek. 2021;74(7):1559-1565

INTRODUCTION

Ukraine and its population is one of the largest in Europe. However, the population of Ukraine is rapidly shrinking. Although emigration played a role, however the largest decline was due to low fertility. According to official data, since Ukraine gained independence in 1991, death rates in the country have been higher than birth rates. Within 29 years, its population declined by 10.0 million, from a high of 51.9 million in 1991 to 41.9 million in 2019 [1]. One of the reasons for the low birth rate in Ukraine is the induced abortion.

In Ukraine, USA, most European and other countries, the law allows abortion on request or on broad social grounds. However, access to abortion remains restricted in some countries. Only six European countries (Andorra, Liechtenstein, Malta, Monaco, Poland and San Marino) retain highly restrictive abortion laws and do not permit abortion on request or on broad social grounds. Andorra, Malta and San Marino do not allow abortion at all [2]. Some European countries' laws set the time limit for abortion on request or broad social grounds between 18-24 weeks of pregnancy, whereas many set the limit around the first trimester of pregnancy. However, all these countries' laws also allow access later in pregnancy in specific circumstances, such as where a woman's health or life is at risk [2].

According to literature, between 2015 and 2019, on average, 73.3 million induced (safe and unsafe) abortions occurred worldwide each year. Twenty eight percent of all pregnancies, and 61% of all unintended pregnancies, ended in an induced abortion [3]. Each year between 4.7% – 13.2% of maternal deaths can be attributed to unsafe abortion [4, 5]. Around 7 million women are admitted to hospitals every year in developing countries, as a result of unsafe abortion [6]. The major complications resulting from the unsafe abortions are hemorrhage, retained products of conception, infection, amniotic fluid embolisms, and injury to the genital tract, uterine perforation, and cervical lacerations [7, 8]. The annual cost of treating major complications from unsafe abortion is estimated at USD 553 million and USD 6 billion for treating post-abortion infertility [9].

Abortion in Ukraine is legal on request during the first twelve weeks of pregnancy. Between 12 and 28 weeks, abortion is available on a variety of grounds, including medical, social and personal grounds, and for any reason with the approval of a commission of physicians. The number of abortions has been increasing in recent years. Unwanted pregnancy in 85-92% ends with abortion at the request of the woman [10]. During the past decade, Ukraine has undergone economic stagnation, potentially affecting health delivery systems, including abortion care provision. However, no studies have postabortion complications in Ukraine.

THE AIM

The aim of this study was to determine trend of legal induced surgical abortion and to assess the frequency of infection complications after termination of pregnancy in Ukraine.

MATERIALS AND METHODS

SETTING AND PARTICIPANTS

We conducted a prospective multicentre cohort study was based on surveillance data of HAI after legal induced surgical abortion in women's from January 1st, 2017 to December 31st, 2019 in Ukraine. We compiled list of the 10 health facilities (five regional/central and five district/general hospitals) in five various regions of Ukraine with the capacity to provide induced abortion procedure. They are similar in terms of medical equipment and number of staff. The study population included 2,621 women aged 15-49 years. All women presenting with induced surgical abortion during the study period were eligible for inclusion. Criteria for exclusion: women after of medical abortion or medical abortion not completed in medical facilities.

DEFINITIONS

Diagnosis of HAIs after abortion was based on criteria from the CDC/NHSN Surveillance Definitions for Specific Types of Infections [11]. Women considering an induced abortion were seen by a gynecologist at the medical facilities. Trimester was measured using clinician-estimated gestational age in weeks (first trimester: 1–12 weeks, second trimester: 13–27 weeks, third trimester: 28 weeks term). First-trimester surgical abortion is performed with vacuum aspiration. This procedure is often referred to as suction curettage. In aspiration abortion does not use sharp curettage [12]. Second-trimester abortion is generally done by a dilation and evacuation procedure [13, 14]. Surgical abortion was classified as elective and urgent by use of standardized criteria by the operative team.

DATA COLLECTION

Data were collected by to two nurses in each facility that coordinated with facility postabortian care providers to track participants. The interviewer sought informed consent to conduct a face-to-face interview with her, as well as her consent to separately interview her healthcare provider about her case and review her medical file. Study staff supervised data collection. In this study, we analyzed the inpatient data and ambulatory medical records to identify HAIs after abortion procedures.

The surveillance protocol and dataset were based on the CDC/NHSN criteria. We collected the data (demographic and clinical data, microbiology, and outcome information from hospital and outpatient records) using structured CDC/NHSN Checklist for Reproductive Tract Infection. Cases of HAIs that met standard case definitions were identified through active follow up during the hospital stay, on return to hospital, and during visits to ambulatory. Women were followed through the patient records system to determine the rate of complications (HAIs). The gynecologist evaluated the time and the cause of the visit. The surveillance period for the patients after surgical abortion was 30 days.

MICROBIOLOGICAL METHODS

All samples were obtained from women with clinical symptoms of HAI. Microbial isolates were identified using standard microbiological techniques. Antibiotic susceptibility testing was performed by using the disk diffusion method according to the recommendations of the European Committee on Antimicrobial Susceptibility Testing (EUCAST).

ETHICS

The Shupyk National Healtcare University of Ukraine Ethics Committee approved this study. Informational consent was obtained from the study participants. All participants' data were anonymised prior to the analysis.

STATISTICAL ANALYSIS

The analysis of statistical data was performed using Excel. Prevalence of HAIs after abortion was reported as the percentage of the total number of women who had surgical abortion procedure. We conducted descriptive analyses to determine frequencies for categorical variables and calculated medians (or means) for continuous variables. We assessed variables demonstrated to be significantly associated with postabortion infections (urban/rural residence, marital status, educational level, pregnancy duration), and variables we hypothesised may be associated with incidence of abortion (age, parity, facility level, wealth status, delays in access to care). Comparisons were undertaken using Student's t-test and Fisher's exact test for categorical variables. Statistical significance was defined as $P<0.05$.

RESULTS

Induced termination of pregnancy in Ukraine

A total of 2630 induced surgical abortions were performed during the study period (2017-2019). Nine patients were excluded, resulting in 2621 induced abortions included in the study. During study period the number of surgical abortions has sharply increased in Ukraine. The number

of induced termination of pregnancy medical indications has increased regularly over the last three years. Trends of surgical abortion in Ukraine are shown in Table I.

The mean age of the women receiving abortions was 25.5 years and 43.8% were nulliparous. The majority of women (61.8%) had not had a prior induced abortion. Of these abortions, 37.6% were performed with vacuum aspiration (First-trimester) and 62.4% done by a dilation and evacuation procedure (Second-trimester). In addition, 71.2% of abortions were urgent and 28.8% elective. The characteristics of women who had an induced surgical abortion are presented in Table II.

PREVALENCE OF HAI AFTER SURGICAL ABORTION

During the study period, 679 of 2,621 patients after surgical abortion were found to have healthcare-associated infections (HAIs), for an overall infection rate of 25.9% [95% CI 24.2 – 27.6]. Of these HAIs, 25.9 (176/679) were Endometritis, 21.8% (148/679) Bacterial Vaginitis, 14.3% (97/679) Parametritis, 13.1% (89/679) Cervicitis, 9.9% (67/679) Adnexa utery, 7.8% (53/679) Salpingitis, 6.3% (43/679) Chorioamnionitis, and 0.9% (6/679) other reproductive tract infections (Table III).

The HAIs rates were 8.1% [95% CI 6.3 – 9.9] after surgical abortion is performed with vacuum aspiration (First-trimester) and 17.8% [95% CI 16.1 – 19.5] and after abortion done by a dilation and evacuation procedure (Second-trimester). In addition, the results of our study showed that the frequency of HAI after surgical abortion is affected by the mode of method abortion: elective – 10.3% [95% CI 8.5 – 12.1] and urgent – 15.6% [95% CI 13.9 – 17.3].

MICROBIOLOGY

Among all 679 HAIs, a total of 761 microorganisms were identified (Table IV). Microorganisms causing HAI includes Gram-positive cocci and Gram-negative bacilli. Considering all HAI types together, *E.coli* were most commonly reported, accounting for 25.9% of all organisms, followed by *Enterococcus* spp (16.2% of all organisms), *Staphylococcus aureus* (15.5% of all organisms), *P. aeruginosa* (10.9% of all organisms), and *Enterobacter* spp. (10.1% of all organisms). These were the same organisms reported most commonly for Reproductive Tract Infection cases.

ANTIMICROBIAL RESISTANCE

Antimicrobial resistance in the isolates associated with HAIs showed, among the gram-positive bacteria, that 19.1% and 3.6% of coagulase-negative staphylococci isolates were b-lactam (oxacillin) – and glycopeptide (teicoplanin)-resistant, respectively. Meticillin resistance was reported in 23.2% of *S aureus* isolates, with known AST results. Vancomycin resistance was reported in 3.7% of isolated enterococci. Among the gram-negative bacteria, third-generation cephalosporins (cefotaxime or ceftazidime) resistance was found in 33.1% of *Klebsiella* spp and in 24.1% of *E.coli* isolates. Carbapenem resistance was reported in 8.1% of all included *Enterobacteriaceae*, also highest in *Klebsiella* spp, and in 31.8% of *P.aeruginosa* isolates and in 36.2% of *Acinetobacter* spp. isolates. Results of univariate analysis showed that no statistically significant difference between infection and the independent covariates was found (data not shown).

DISCUSSION

To our knowledge, this study was the first attempt to assess the overall burden of HAIs after legal induced surgical abortion in women's at the national level in Ukraine. Induced abortion is one of the most common surgical procedures in the world. During study period the number of surgical abortions has sharply increased in Ukraine. This study showed that the number of induced termination of pregnancy medical indications has increased regularly over the last three years. Participants in our study varied in income, education, and region. While their responses are not representative of the country as a whole, they provide insights into attitudes toward the quantity and timing of fertility and yield background information used to generate hypotheses and guide the interpretation of quantitative analyses. Ukraine differs from other very low fertility countries, especially in regard to the timing of first births and the postponement of or reduction in second births. This is due to the fact that, during the past decade, Ukraine has undergone economic stagnation, potentially affecting health delivery systems,

Table I. Trends of surgical abortion in Ukraine (2017-2019)

Region of Ukraine	All number of abortion	Number of surgical abortion			Trend in 2017-2019, %
		2017	2018	2019	
Northern region	547	156	173	218	+28,4
South Region	511	141	163	207	+31,9
Western region	374	122	124	128	+4,7
Eastern region	573	154	188	231	+33,3
Central (Kyiv) region	616	148	179	289	+48,8
Total	2621	721	827	1073	+32,8

Table II. Characteristics of women presenting with induced surgical abortion during 2017-2019 in medical facilities, Ukraine.

Characteristics	Residence				All number of abortion		95% CI
	urban		rural				
	n	%	n	%	n	%	
Age group							
15-19	68	28,5	171	71,5	239	9,1	7,3 – 10,9
20-24	216	34,7	407	65,3	623	23,8	22,1 – 25,5
25-29	291	38,0	475	62,0	766	29,2	27,6 – 30,8
30-34	211	41,1	303	58,9	514	19,6	17,9 – 21,3
35-39	122	41,6	171	58,4	293	11,2	9,4 – 13,0
40-44	83	56,1	65	43,9	148	5,6	3,8 – 7,4
45-49	23	60,5	15	39.5	38	1,4	0,5 – 2,3
Type of surgical abortion							
Acute	418	22,4	1449	77,6	1867	71,2	70,1 – 72,2
Elective	537	71,2	217	28,8	754	28,8	27,2 – 30,5
Used contraception							
No	322	17,8	1489	82,2	1811	69,1	68,0 – 70,2
Yes	517	63,2	293	36,8	810	30,9	29,3 – 32,5
Marital status							
Single	817	63,5	470	36,5	1287	49,1	47,7 – 50,5
Married	183	37,7	290	62,3	473	18,1	16,4 – 19,8
Divorced	527	61,2	334	38,8	861	32,8	31,2 – 34,4
Educational level							
Secondary school	343	25,8	988	74,2	1331	50,8	49,4 – 52,2
College and above	494	70,9	203	29,1	697	26,6	24,9 – 28,3
Highs school	481	81,1	112	18,9	593	22,6	20,9 – 24,3
Occupational status							
Employed	208	48,8	218	51,2	426	16,3	14,6 – 18,0
Merchant	314	62,7	187	37,3	501	19,1	17,4 – 20,8
Students	863	88,9	108	11,1	971	37,0	35,5 – 38,5
Unemployed	211	29,2	512	70,8	723	27,6	26.0 -29.2
Relative wealth data							
Poor	476	37,0	811	63,0	1287	49,1	47,7 – 50,5
Medium	598	68,5	275	31,5	873	33,3	31,7 – 34,9
Wealthy	368	79,8	93	20,2	461	17,6	15,9 – 19,3
Reasons for delay to abortion							
Partner or family member decides	860	43,3	1127	56,7	1987	75,8	74,8 – 76,8
Lack of transportation	0	0,0	141	100,0	141	5,4	3,5 – 7,5
Distance to facility	0	0,0	141	100,0	256	9,8	8,0 – 11,6
Many patients in line for care	12	5,1	225	94,9	237	9,0	7,2 – 10,0
Total	1084	38,7	1607	61,3	2621	100,0	

including abortion care provision. However, no studies have post-abortion complications in Ukraine.

One of the major complications resulting from the unsafe abortions is reproductive tract infection [7, 8]. The reported infection rate following first trimester surgical abortion ranges widely due to various clinical practices and degrees of ascertainment and diagnostic biases.

According to literature, for post-abortion infections, the rates were very variable between studies (from 0.7% to 3.6% with one study reporting 8%) [15-19]. In our study during the

Table III. Types of healthcare-associated infection (HAI) (n=679) after surgical abortion in Ukraine (2017-2019)

HAI type	Cases of HAI		95% CI[a]
	n	%	
Adnexa utery	67	9.9	8.7 – 11.1
Salpingitis	53	7.8	6.8 – 7.8
Endometritis	176	25.9	24.2 – 27.6
Parametritis	97	14.3	13.0 – 15.6
Chorioamnionitis	43	6.3	5.4 – 7.2
Bacterial Vaginitis	148	21.8	20.2 – 23.4
Cervicitis	89	13.1	11.8 – 14.4
Other[b]	6	0.9	0.5 – 1.3

[a]CI, confidence interval.
[b]Includes Pelvic abscess (n=2), Sepsis (n=1), and vaginal cuff infections (n=3)

Table IV. Pathogens reported during surveillance for HAIs after induced surgical abortion in Ukraine, 2017-2019

Microorganism	Organisms reported	
	n	%
Escherichia coli	197	25,9
Enterococcus spp.	123	16,2
Staphylococcus aureus	118	15,5
Pseudomonas aeruginosa	83	10,9
Enterobacter spp.	77	10,1
Klebsiella spp.	49	6,4
Coagulase-negative staphylococci	41	5,4
Acinetobacter spp.	37	4,9
Proteus spp.	19	2,5
Other*	17	2,2

*"Other" includes 8 different organism

study period, 25.9% patients after surgical abortion were found to have HAIs. Of these HAIs, 25.9 were Endometritis, 21.8% Bacterial Vaginitis, 14.3% Parametritis, 13.1% Cervicitis, 9.9% Adnexa utery, 7.8% Salpingitis, 6.3% Chorioamnionitis, and 0.9% other reproductive tract infections. This rate was significantly higher than the rate observed in other country after terminated pregnancy but probably is a reflection of the variable abortion practices and definition of HAIs used in these different countries. Approximately 30% of abortion-related deaths are attributable to infection [20]. No deaths were found in our study.

In our study microorganisms causing HAI after surgical abortion includes Gram-positive cocci and Gram-negative bacilli. Considering all HAI types together, *E.coli* were most commonly reported, accounting for 25.9% of all organisms, followed by *Enterococcus* spp., *Staphylococcus aureus, P. aeruginosa*, and *Enterobacter* spp. These were the same organisms reported most commonly for Reproductive Tract Infection cases [21, 22].

The selective use of antibiotics for prophylaxis is one of the key advances in infection control. Antibiotic prophylaxis lowers the risk of infection following surgical abortion and therefore should be provided to all patients undergoing surgically induced abortion [15, 23]. Inappropriate use of antibiotics contributes to the development of antibiotic resistant bacteria and can therefore also lead to morbidity. It is helpful for physicians to understand the antimicrobial resistance of potential causing pathogens of post-abortion infections [8, 21-24]. In our study antimicrobial resistance in the isolates associated with HAIs showed, among the gram-positive bacteria, that 19.1% and 3.6% of coagulase-negative staphylococci isolates were b-lactam (oxacillin) – and glycopeptide (teicoplanin)-resistant, respectively. Meticillin resistance was reported in 23.2% of *S aureus* isolates, with known AST results. Vancomycin resistance was reported in 3.7% of isolated enterococci. Among the gram-negative bacteria, third-generation cephalosporins (cefotaxime or ceftazidime) resistance was found in 33.1% of *Klebsiella* spp and in 24.1% of *E.coli* isolates. Carbapenem resistance was reported in 8.1% of all included *Enterobacteriaceae*, also highest in *Klebsiella* spp, and in 31.8% of *P. aeruginosa* isolates and in 36.2% of *Acinetobacter* spp. isolates.

STUDY STRENGTHS AND LIMITATIONS

The strengths of this study lie in its prospective nature, and application of NHSN methodology. However, the limitations of this study also need to be noted. Case ascertainment may have

been suboptimal for several reasons. First, due to limitations in resources, microbiology and laboratory testing occasionally became temporarily unavailable. Second, in Ukraine, there is widespread use of empiric antimicrobial therapy and limited use of the clinical microbiology laboratory.

In Ukraine one approach to reducing abortion-related morbidity and mortality involves improving access to and quality of abortion and post-abortion care. National guidelines for comprehensive abortion and post-abortion care have been in place since 2010. However, during the past decade, Ukraine has undergone economic stagnation, potentially affecting health delivery systems, including abortion care provision. Access to abortion care may also be limited due to stigma, costs and other factors leading to delays in seeking care. No recent studies have examined factors associated with abortion and post-abortion complications in Ukraine. In the future, it is necessary to conduct a multicenter survey to assess the severity and management of post-abortion complications, and to understand the factors associated with abortion in Ukraine.

CONCLUSIONS

Number of surgical abortions has sharply increased in Ukraine. The results of this study revealed high rates of HAI after surgical abortion and most causing pathogens were associated with resistant to antibiotic strains. Improper antibiotic prophylaxis are important risk factors in the development of HAIs. Further research is required to determine which set of interventions optimize prevention of HAIs after surgical abortion.

REFERENCES

1. State Statistics Service of Ukraine. Population of Ukraine, 2019. Demographic Yearboo. State Statistics Service of Ukraine. 2020. http://database.ukrcensus.gov.ua/PXWEB2007/ukr/publ_new1/2020/zb_nas_2019.pdf
2. European Abortion Laws. A Comparative Overview. https://reproductiverights.org/wp-content/uploads/2020/12/European-abortion-law-a-comparative-review.pdf
3. Bearak J., Popinchalk A., Ganatra B. et al. Unintended pregnancy and abortion by income, region, and the legal status of abortion: estimates from a comprehensive model for 1990–2019. Lancet Glob Health. 2020; 8(9):e1152-e1161. doi: 10.1016/S2214-109X(20)30315-6.
4. Say L., Chou D., Gemmill A. et al. Global causes of maternal death: a WHO systematic analysis. Lancet Glob Health. 2014;2(6):e323-33. doi: 10.1016/S2214-109X(14)70227-X.
5. Global Burden of Disease Study 2015. Global burden of disease study 2015 (gbd 2015) healthcare access and quality index based on amenable mortality 1990-2015. Seattle: Institute for Health Metrics and Evaluation, 2017. Available at: http://ghdx.healthdata.org/gbd-results-tool.
6. Singh S., Maddow-Zimet I. Facility-based treatment for medical complications resulting from unsafe pregnancy termination in the developing world, 2012: a review of evidence from 26 countries. BJOG. 2016;123(9):1489-98. doi: 10.1111/1471-0528.13552.
7. Ganatra B., Gerdts C., Rossier C. et al. Global, regional, and subregional classification of abortions by safety, 2010-14: estimates from a Bayesian hierarchical model. Lancet. 2017;390(10110):2372-2381. doi: 10.1016/S0140-6736(17)31794-4.
8. Orlowski M.H., Soares W.E., Kerrigan K.A. et al. Management of Postabortion Complications for the Emergency Medicine Clinician. Ann Emerg Med. 2021;77(2):221-232. doi: 10.1016/j.annemergmed.2020.09.008.
9. Vlassoff E. et al. Economic impact of unsafe abortion-related morbidity and mortality: evidence and estimation challenges. Brighton, Institute of Development Studies. 2008.
10. Order of the MO H of Ukraine from 31.12.2010 № 1177 «Comprehensive care during an unwanted pregnancy». https://zakon.rada.gov.ua/rada/show/v1177282-10?lang=en#Text.
11. Horan T.C., Andrus M., Dudeck M.A. CDC/NHSN surveillance definition of health care-associated infection and criteria for specific types of infections in the acute care setting. Am J Infect Control. 2008;36(5):309-332. doi:10.1016/j.ajic.2008.03.002.
12. Yonke N., Leeman L.M. First-trimester surgical abortion technique. Obstet Gynecol Clin North Am. 2013;40(4):647-70. doi: 10.1016/j.ogc.2013.08.006.
13. ACOG Practice Bulletin No. 135: Second-trimester abortion. Obstet Gynecol. 2013;121(6):1394-1406. doi: 10.1097/01.AOG.0000431056.79334.cc.
14. White K.O., Jones H.E., Shorter J. et al. Second-trimester surgical abortion practices in the United States. Contraception. 2018:S0010-7824(18)30140-9. doi: 10.1016/j.contraception.2018.04.004.
15. Achilles S.L., Reeves M.F. Society of Family Planning. Prevention of infection after induced abortion: release date October 2010: SFP guideline 20102. Contraception. 2011;83(4):295-309. doi: 10.1016/j.contraception.2010.11.006.
16. Grossman D., Blanchard K., Blumenthal P. Complications after second trimester surgical and medical abortion. Reprod Health Matters. 2008;16(31 Suppl):173-82. doi: 10.1016/S0968-8080(08)31379-2.
17. Grimes D.A., Smith M.S., Witham A.D. Mifepristone and misoprostol versus dilation and evacuation for midtrimester abortion: a pilot randomised controlled trial. BJOG. 2004;111(2):148-53. doi: 10.1046/j.1471-0528.2003.00044.x-i1.
18. Autry A.M., Hayes E.C., Jacobson G.F. et al. A comparison of medical induction and dilation and evacuation for second-trimester abortion. Am J Obstet Gynecol. 2002;187(2):393-7. doi: 10.1067/mob.2002.123887..
19. Guillem P., Racinet C., Leynaud A. et al. Evaluation de la morbidité maternelle après interruption médicamenteuse de grossesse à partir de 12 semaines d'aménorrhée [Evaluation of maternal morbidity after drug-induced termination of pregnancy (TOP) after 12 gestation weeks]. J Gynecol Obstet Biol Reprod (Paris). 2003;32(3):227-38.
20. Bartlett L.A., Berg C.J., Shulman H.B. et al. Risk factors for legal induced abortion-related mortality in the United States. Obstet Gynecol. 2004;103(4):729-37. doi: 10.1097/01.AOG.0000116260.81570.60.
21. Salmanov A.G., Vitiuk A.D., Hrynchuk S.Ya. et al. Vaginal cuff infection after hysterectomy in Ukraine. Wiad Lek. 2021;74(2):196-201. doi:10.36740/WLek202102104.
22. Salmanov A.G., Suslikova L.V., Pandei S.A. et al. Healthcare associated Deep pelvic tissue infection and other infections of the female reproductive tract in Ukraine. Wiad Lek. 2021;74(3):406-412. doi: 10.36740/WLek202103105.
23. Ledger W.J. Prophylactic antibiotics in obstetrics-gynecology: a current asset, a future liability? Expert Rev Anti Infect Ther. 2006;4(6):957-64. doi: 10.1586/14787210.4.6.957.
24. National Abortion Federation 2020 Clinical policy guidelines for abortion care. https://prochoice.org/education-and-advocacy/cpg/.

We would like to thank all the nurses and physicians who contributed to the prevalence surveys.
This work is a fragment of a research study of the Scientific Research Laboratory of Shupyk National Medical Academy of Postgraduate Education (Kyiv, Ukraine). Title: The scientific justification for measures to combat the resistance of microorganisms to antimicrobial drugs in Ukraine on the "One Health" approaches. State Registration Number: 0120U101440. Study period: 2020-2022. This work was funded by the Ministry of Health of Ukraine according to the plan of that research study. The authors did not receive any financial support from the manufacturers of medical instruments and drugs.

ORCID and contributionship:
Aidyn G. Salmanov: 0000-0002-4673-1154 [A,C,D,E,F]
Serhiy M. Baksheev: 0000-0003-4144-5965 [B, C, D, F]
Dmytro V. Kuflovskyi: 0000-0002-6886-1419 [B, C, D, F]
Liudmyla V. Manzhula: 0000-0003-3142-7237 [B, C, D, F]
Oleksandr A. Voloshyn: 0000 0002- 6586- 5449 [B,C, D, F]
Svitlana M. Korniyenko: 0000-0003-3743-426X [B, C, D, F]
Oleh I. Tsyhanenko: 0000-0002-0485-6979 [C, D, F]

Conflict of interest:
The Authors declare no conflict of interest

CORRESPONDING AUTHOR
Aidyn G. Salmanov
Shupyk National Healthcare University of Ukraine,
9 Dorohozhytska St., 04112, Kyiv, Ukraine
tel: +38 066 799 76 31
e-mail: mozsago@gmail.com

Received: 10.03.2021
Accepted: 29.06.2021

A – Work concept and design, **B** – Data collection and analysis, **C** – Responsibility for statistical analysis, **D** – Writing the article, **E** – Critical review, **F** – Final approval of the article