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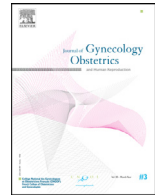
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Original Article

Did COVID-19 quarantine redirect habitual patient visits in the gynecology emergency room?



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ABSTRACT

Objective: COVID-19 pandemic caused a dramatic decline in the gynecology emergency department (ED) visits. The Israeli government took a determined step of quarantine to suppress and control the spread. This study evaluates the effect of the COVID -19 quarantine on gynecology emergency department (ED) visits compared to the previous year.

Materials and methods: A retrospective case-control study was conducted during the first half-year of the COVID-19 pandemic and focused on the quarantine during April. In order to identify differences in the population's epidemiology and changes in the amount and type of emergency gynecological visits and surgeries, we compared patients during April 2020 (COVID-19 quarantine) to those who visited the gynecology ED during April 2019.

Results: During January–June 2020 period, there was an overall 3707 patient visits in the gynecology ED, which represents a 22.8% decrease in patient visits compared to the previous year (2019, 4803 patients). There was a 36% decrease in the gynecology ED visits during the quarantine period. Patient demographics were similar between groups. Visits of nulliparous women were more common in the study group ($p = .0001$) and self-referral ($p = .017$). More post-operative complications and fewer patients with abdominal pain were admitted to the study group ($p = .034$ and $p = .054$, respectively). During the study, the hospitalization rate did not change 18.2% vs. 17.5% ($p = 0.768$). Hospitalization duration was significantly longer in the COVID-19 quarantine (2.8 ± 1.3 vs. 3.1 ± 1.5 , $p < 0.001$). There was no significant difference among surgical procedure incidents.

Conclusion: Visits in the gynecology ED service decreased during the COVID-19 quarantine without compromising the treatment of gynecology emergencies. Many gynecologic complaints can be managed in community care settings without referral to an ED.

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Introduction

In late 2019, the coronavirus (COVID-19) was first identified in Wuhan, a city in China's Hubei Province. Eventually, in February 2020, the World Health Organization (WHO) enounced that COVID-19 was recognized as a pandemic [1,2]. The first patient with COVID-19 was identified in Israel on February 27, 2020. The Israeli government took determined steps, including crowd restriction, and closed unnecessary workplaces to suppress and control the spread. The Israel Ministry of Health set up dedicated task forces composed of police officers and inspectors to prevent the virus's spread. On March 19, new guidelines were instituted after 224 new corona patients were diagnosed per day. These guidelines required all citizens to quarantine to suppress the virus's dramatic spread.

Our hypothesis is that many patients who visit the gynecologic emergency department (ED) can receive appropriate care at outpatient clinics. However, many of these cases are still treated in hospital ED [3]. Healthcare in Israel is universal, and participation in a medical insurance plan is compulsory. All Israeli residents are entitled to primary health care as a fundamental right [4].

Although many gynecological emergency department admissions are due to emergency surgeries (i.e., hemorrhagic corpus luteum, adnexal torsion, extra-uterine pregnancy), emergent vaginal bleeding, and incomplete abortions [5,6], unnecessary ED referral is a disturbing problem involving patient safety [7]. Crowded ED can increase the rate of medical errors, resulting in poorer health outcomes, including death [8,9]. The purpose of this retrospective case-control study was to investigate differences in gynecology ED visit trends during the first months of the pandemic compared to the previous year.

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Materials and methods

This retrospective cohort study was conducted in a single tertiary care medical center. The data was retrieved from hospital and outpatient electronic medical records during the study period.

Visits in the ED from January 1 through June 30, 2019, and 2020 were analyzed to understand visits trend during the pandemic compared to the same period the previous year. In Israel, there are two separate obstetrics and gynecology ED. The first ED is the gynecology ED, which takes care of all general gynecology complaints and pregnancy-related cases till the viability age of pregnancy 23–24 weeks of gestation). The second one is the obstetric ED, which serves the pregnant patient with a viable pregnancy.

We chose to focus on the gynecology ED as we wanted to see the change in visit trends, believing that the pregnancy and the delivery rate would not change during this period. The study included all patients who visit the gynecology ED. After understanding the trend that emphasized a dramatic decrease in the gynecologic ED patient visits, we focus on the COVID-19 quarantine during April 2020 who had the most dramatic visits decline.

The cohort was divided into two groups. The study group included patients who had visited the ED during April 2020 (COVID-19 quarantine), while the control group comprised those who had visited during April 2019.

Demographic data, number of admissions, hospitalization, duration, emergency operations, preoperative diagnosis, and intraoperative findings were obtained from the electronic medical records. Data from April 2019 was compared to April 2020 (COVID-19 quarantine) to identify possible changes resulting from the quarantine during this period. This study's primary outcome was to identify differences in the population's epidemiology, which visits the gynecology ED. The secondary outcome was to determine whether there were changes in the amount and type of emergency gynecological surgeries during the COVID-19 quarantine.

Ethics

The study was approved by the Institutional Ethics Committee (project number 0112-20-MMC, May 2020). Inform consent was not required.

Statistical analysis

Nominal data were described as numbers and percentages. Continuous data were assessed for normal distribution (Shapiro-Wilk test) and were described as mean \pm standard deviation (SD) or median and range. Quantitative data were analyzed using chi-squared or Fisher exact test. Continuous variables were compared between groups using t-test or Mann-Whitney nonparametric test; each as appropriate. $P < .05$ was considered statistically significant. Relative risk (RR) was calculated using the Fisher's Exact Probability statistic, the Maximum-Likelihood Ratio Chi-Square, and Pearson's Chi-Square. Data were analyzed using statistical software (SPSS, V23, IBM Corp, Armonk, NY).

Results

During January-June 2020, there was an overall 3707 patient visits in the gynecology ER, representing a 22.8% decrease in patient visits compared to 2019 (4803 patients) (Fig. 1). During the quarantine month, the number of visits was the lowest.

During the study periods (April 2019 and April 2020—COVID-19 quarantine), there were 801 vs. 513 visits in the Gynecology ED, respectively. Demographics (Table 1), including age, ethnicity, BMI, smoking, pregnancy, and re-admission rates, were similar between groups. More nulliparous women were visiting the study group

Table 1
Patient demographics.

	April 2019N = 801	April 2020N = 513	P Value
Age (years), mean \pm SD	35.6 \pm 11.8	35.3 \pm 12.2	.660
BMI, mean \pm SD	25.2 \pm 5.3	25.5 \pm 6.1	.367
Smoking, N (%)	28 (3.5)	17 (3.3)	.860
Nulliparous, N (%)	55 (6.9)	140 (27.3)	.001
Pregnant, N (%)	428 (53.4)	269 (52.4)	.724
Self-referral, N (%)	193 (24.1)	95 (18.5)	.017
Re-visits, N (%)	124 (15.5)	82 (16)	.806

SD, standard deviation; BMI, body mass index, kg/m².

period (6.9% vs. 27.3%, $p = .001$). Significant less self-referral occurred ($p = .017$).

Surgical procedures are summarized in Table 2. There was no significant difference between the types of surgical procedures performed in each period. The odds ratio was not significant between groups. In both groups, most patients underwent dilation and curettage. In April 2019, 20 emergent laparoscopic surgeries were performed, and 10 in April 2020 ($p = .446$). The percentages of dilation and curettage performed for missed abortions were similar (54% in April 2019 and 56% in 2020, $p = .820$). The number of emergent vaginal surgical procedures were similar as well (13.1% vs. 12.8, respectively=.965).

Indications for ED visits during the study periods (April 2019 and April 2020 quarantine) are shown in Table 3. Among the study group, more patients with post-operative complications and fewer patients with abdominal pain were visits to the ED ($p = .034$ and $p = .054$, respectively). Among patients referred to the gynecology ED, most were due to pregnancy-related emergencies (46.6% vs. 48.3%), as in the previous year.

Patients' status when visiting the ED is shown in Table 4. The hospitalization rates were similar 18.2% vs. 17.5%, respectively ($p = 0.768$).

Hospitalization duration (days) was significantly longer in the COVID-19 quarantine period, as compared to admissions in the previous year (3.1 \pm 1.5 days vs. 2.8 \pm 1.3, respectively; $p < 0.001$). Similar percentages of patients needed hospitalization in both periods.

Discussion

Early in 2020, the COVID-19 pandemic burst into our lives worldwide. The pandemic had a significant effect on our daily work in the gynecology ward and the gynecology ED [10]. The number of ED visits decreased by 22% during the first half of 2020 and by 36% during the quarantine period over April 2020. We think that those changes were likely due to two reasons. Fear of the population from exposure to COVID-19 during their contact with medical personal and other people in the healthcare system caused them to avoid obtaining healthcare services. As demonstrated in our results, self-referrals were significantly lower during the quarantine. Community service clinics were less available resulting in fewer referrals.

In this study, the total number of nulliparous patients who visit the ED was significantly higher. This finding agrees with another study [11] that reported that 56.2% of visits were nulliparous women. The high number of nulliparity might be due to the reduced availability of community health services combined with a nulliparous woman's fear [12,13]. It seems reasonable that lack of familiarity with pregnancy symptoms and previous pregnancies resulted in more patients coming to the ED.

Aksoy et al. [14] reported a cohort of 30,853 patients who visited the gynecology ED, of which most cases were pregnancy-related complaints. This finding correlates to the current study, in which most ED visits were due to pregnancy-related complaints in both periods. We assume that stress from pregnancy complications, even during the COVID-19 outbreak, caused pregnant women to refer

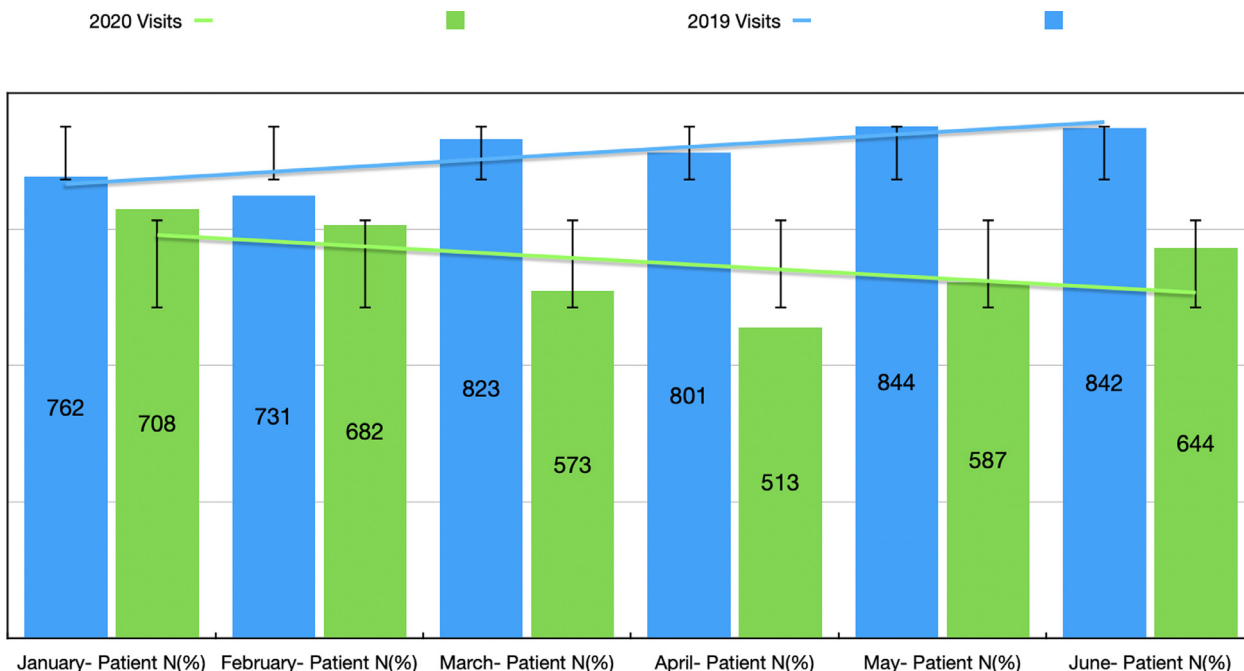


Fig. 1. Patient visits at the Emergency Department between January–June 2019 and 2020. An overall 4803 patient visits in the gynecology ER during the first half of 2019 period. An overall 3707 patient visits in the gynecology ER during the first half of 2020 period (22.8% decrease in patient visits).

Table 2
Surgical procedures name at admission.

Variable	April 2019N = 61/801	April 2020N = 39/513	Odd ratio (95% CI)	P-value
Emergency Laparoscopic procedures, n (%) *	20 (32.7%)	10 (25.6%)	0.776 (0.36–1.67)	.517
Appendectomy, n (%)	2 (3.2%)	1 (2.5%)		
Adnexal de-torsion, n (%)	12 (19.6%)	2 (5.1%)		
Extra-uterine pregnancy (salpingectomy)	4 (6.5%)	6 (15.3%)		
Hemorrhagic corpus luteus	1 (1.6%)	0 (0%)		
Diagnostic	1 (1.6%)	1 (2.5%)		
Emergent Dilatation & curettage, n (%)	33 (54%)	22 (56%)	1.042 (0.60–1.80)	.881
Emergency vaginal procedures, n (%)	8 (13.1%)	5 (12.8%)	0.975 (0.31–2.99)	.965
Myomectomy, n (%)	0 (0%)	1 (2.5%)		
Vaginal laceration, n (%)	4 (6.5%)	1 (2.5%)		
Abscess drainage, n (%)	3 (4.9%)	1 (2.5%)		
Cervical cerclage	1 (1.6%)	2 (5.1%)		

The odds ratio (OR), its standard error, 95% confidence interval, and P value are calculated according to Altman, 1991.

* Percentage has described the percent of specific procedures of the entire procedures.

Table 3
Patient indications of ED referral to the emergency department.

Admission diagnosis	2019N = 801	2020N = 513	P-value
Pregnancy emergency, N (%)	373 (46.6%)	248 (48.3%)	.529
Pregnancy/post-partum complication, N (%)	74 (9.2%)	35 (6.8%)	.121
Abdominal pain, N (%)	131 (16.4%)	64 (12.5%)	.054
Post-operative complication, N (%)	17 (2.1%)	21 (4.1%)	.038
General gynecology, N (%)	206 (25.7%)	145 (28.3%)	.309

Table 4
Patient status after referral to the ED.

Variable	April 2019N = 801	April 2020N = 513	P-value
Revisits, n (%)	124 (15.5%)	82 (16%)	.806
Left without examination, n (%)	15 (1.8%)	14 (2.7%)	.302
Patient discharged with antibiotic prescription, n (%)	64 (7.9%)	28 (5.4%)	.079
Admitted, n (%)	146 (18.2%)	90 (17.5%)	.768
Hospitalization duration (days) mean ± SD	2.8 ± 1.3	3.1 ± 1.5	.001
Emergency surgical procedure, n (%)	61 (7.6%)	39 (7.6%)	1

SD, standard deviation.

themselves to the ED. In contrast, we found fewer ED visits due to abdominal pain ($p = .053$). This finding can be explained by the fear of the population to seek healthcare services during the COVID-19 outbreak [15,16]. We saw significantly more visits due to post-operative complications in the study period compared to the previous year (4.1% vs. 2.1% respectively; $p = .038$). McPherson et al. [17] reported a 3% rate of severe complications among a cohort of 37,512 women from a national database. These results vary widely between 0.2% and 10.3% [18] and depend on the type of surgery. Our study's difference could be due to a total decrease in ED visits.

ED visits can be divided into two groups. The first includes patients who could be taken care of in a community clinic and did not need the ED. However, they came to the ED because of stress and convenience. We assume that this group reduced during the COVID-19. The second group included cases in which true emergencies need to be ruled out, such as evaluating abdominal pain and gynecological emergencies, including ectopic pregnancy, pregnancy complications, post-operative complications, etc. This is reflected in the post-operative complications seen in the study results that didn't change between the groups.

Furthermore, although one can assume that the number of emergent surgical interventions would be relatively consistent, there were fewer during the quarantine and in proportion to the size of the population admitted.

Most interventions were dilatation and curettage, and there was no significant difference among other types of surgical interventions. Although not substantial, this gap can be explained by more patients preferring medical treatment for early pregnancy miscarriage rather than surgical intervention during the quarantine. Again, this can be explained by fear of exposure to COVID-19 during the hospital stay, resulting in more patients choosing medical treatment.

A recent study by Spurlin et al. [19] dealt with the same issue of the dramatic decrease of patients visit in the ED. Our research agrees with its conclusions that emergency surgical procedures and cases didn't change between the periods. It's important to note that our study had a dramatically bigger cohort number (79 vs. 513 during the study period). A transition to telehealth during the pandemic period can explain this dramatic difference, which isn't available in our institute.

As we expected, total visits to the gynecology ED were markedly reduced during the COVID-19 outbreak, but with no change in emergency interventions and hospital admissions. This period's data led us to conclude that many ED visits could be addressed by the community healthcare system and in outpatient clinics during regular times. The overload on the gynecology ED service during the standard period was reduced during the COVID-19 quarantine. Although the number of emergency interventions was not significantly different, a study of Dvash et al. [20] raises a concern regarding a delay in referring to the ED. They demonstrated substantially higher ruptured ectopic pregnancy during the covid 19 pandemic. The number of ectopic pregnancies in this study is not sufficient to prove this trend.

This study's strength is that our hospital serves as a tertiary referral center for all emergencies in the geographic area, to which most if not all gynecologic emergencies are referred. However, it is possible that some women might have gone to a hospital outside our geographical area. A limitation of this study is its relatively small sample size. Another limitation is a lack of data on patient referrals to outpatient clinics.

Conclusion

During the initial COVID-19 outbreak, especially during the April 2020 quarantine, the gynecology ED visits dropped significantly. This indicates that community healthcare providers should evaluate most patients before referring them to the hospital ED. The number of

patients with emergencies requiring surgical interventions other than curettage was similar in both periods. The population should be educated to manage their medical care primarily within community services and to avoid self-referrals as much as possible.

Ethics approval

The study was approved by the Institutional Ethics Committee (project number 0112-20-MMC, May 2020). Informed consent was not required.

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None to declare.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

CRediT authorship contribution statement

Yair Daykan: Writing - original draft, Data curation. **Rina Tamir Yaniv:** Writing - review & editing. **Yael Yagur:** Data curation. **Meir Pomeranz:** Writing - review & editing. **Nissim Arbib:** Data curation. **Zvi Klein:** Writing - review & editing. **Ron Schonman:** Writing - review & editing.

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References

- [1] WHO. WHO Coronavirus Disease (COVID-19) Outbreak Situation. WHO; 2020 Coronavirus Dis Outbreak Situata.
- [2] World Health Organization. WHO Timeline COVID-19. World Health Organization; 2020 World Heal Organ.
- [3] Busby J, Purdy S, Hollingworth W. How do population, general practice and hospital factors influence ambulatory care sensitive admissions: a cross sectional study. BMC Fam Pract 2017. doi: 10.1186/s12875-017-0638-9.
- [4] Aaron EM, Andrews CS. Integration of advanced practice providers into the Israeli healthcare system. Isr J Health Policy Res 2016. doi: 10.1186/s13584-016-0065-8.
- [5] ACOG practice bulletin no. 193: tubal ectopic pregnancy. Obstet Gynecol 2018. doi: 10.1097/AOG.0000000000002560.
- [6] Adnexal torsion in adolescents: ACOG committee opinion no. 783. Obstet Gynecol 2019. doi: 10.1097/AOG.0000000000003373.
- [7] Hoot NR, Aronsky D. Systematic review of emergency department crowding: causes, effects, and solutions. Ann Emerg Med 2008. doi: 10.1016/j.annemergmed.2008.03.014.
- [8] Sprivilis PC, Da Silva JA, Jacobs IG, Frazer ARL, Jelinek GA. The association between hospital overcrowding and mortality among patients admitted via Western Australian emergency departments. Med J Aust 2006. doi: 10.5694/j.1326-5377.2006.tb00203.x.
- [9] Richardson DB. Increase in patient mortality at 10 days associated with emergency department overcrowding. Med J Aust 2006. doi: 10.5694/j.1326-5377.2006.tb00204.x.
- [10] Dashraath P, Wong JJ, Lim MXK, Lim LM, Li S, Biswas A, et al. Coronavirus disease 2019 (COVID-19) pandemic and pregnancy. Am J Obstet Gynecol 2020. doi: 10.1016/j.ajog.2020.03.021.
- [11] Thangarajah F, Baur C, Hamacher S, Mallmann P, Kirn V. Emergency department use during pregnancy: a prospective observational study in a single center institution. Arch Gynecol Obstet 2018. doi: 10.1007/s00404-018-4684-x.
- [12] Ali NS, Azam IS, Ali BS, Tabbusum G, Moin SS. Frequency and associated factors for anxiety and depression in pregnant women: a hospital-based cross-sectional study. Sci World J 2012. doi: 10.1100/2012/653098.
- [13] Räisänen S, Lehto SM, Nielsen HS, Gissler M, Kramer MR, Heinonen S. Risk factors for and perinatal outcomes of major depression during pregnancy: a population-based analysis during 2002-2010 in Finland. BMJ Open 2014. doi: 10.1136/bmjopen-2014-004883.
- [14] Aksoy H, Aksoy U, Ozturk M, Ozyurt S, Acmaz G, Karadag OI, et al. Utilization of emergency service of obstetrics and gynecology: a cross-sectional analysis of a training hospital. J Clin Med Res 2015. doi: 10.14740/jocmr2013w.

- [15] Tam CCF, Cheung KS, Lam S, Wong A, Yung A, Sze M, et al. Impact of coronavirus disease 2019 (COVID-19) outbreak on st-segment-elevation myocardial infarction care in Hong Kong, China. *Circ Cardiovasc Qual Outcomes* 2020. doi: [10.1161/CIRCOUTCOMES.120.006631](https://doi.org/10.1161/CIRCOUTCOMES.120.006631).
- [16] Lazzerini M, Barbi E, Apicella A, Marchetti F, Cardinale F, Trobia G. Delayed access or provision of care in Italy resulting from fear of COVID-19. *Lancet Child Adolesc Health* 2020. doi: [10.1016/S2352-4642\(20\)30108-5](https://doi.org/10.1016/S2352-4642(20)30108-5).
- [17] McPherson K, Metcalfe MA, Herbert A, Maresh M, Casbard A, Hargreaves J, et al. Severe complications of hysterectomy: the VALUE study. *BJOG An Int J Obstet Gynaecol* 2004. doi: [10.1111/j.1471-0528.2004.00174.x](https://doi.org/10.1111/j.1471-0528.2004.00174.x).
- [18] Querleu D, Chapron C, Chevallier L, Bruhat MA. Complications of gynecologic laparoscopic surgery – a french multicenter collaborative study. *N Engl J Med* 1993. doi: [10.1056/nejm199305063281817](https://doi.org/10.1056/nejm199305063281817).
- [19] Spurlin EE, Han ES, Silver ER, May BL, Tatonetti NP, Ingram MA, et al. Where have all the emergencies gone? The impact of the COVID-19 pandemic on obstetric and gynecologic procedures and consults at a New York City hospital. *J Minim Invasive Gynecol* 2020. doi: [10.1016/j.jmig.2020.11.012](https://doi.org/10.1016/j.jmig.2020.11.012).
- [20] Dvash S, Cuckle H, Smorgick N, Vaknin Z, Padoa A, Maymon R. Increase rate of ruptured tubal ectopic pregnancy during the COVID-19 pandemic. *Eur J Obstet Gynecol Reprod Biol* 2021;259. doi: [10.1016/j.ejogrb.2021.01.054](https://doi.org/10.1016/j.ejogrb.2021.01.054).