Ulster Med J 2023;**92(2):**84-88

Clinical Paper

The effect of COVID-19 on the cervical screening programme within a Northern Irish Health and Social care trust

Josh Courtney McMullan, Laura Rainey, David Morgan, Lorraine Johnston

Precis

COVID-19 has had a significant impact on the waiting times for cervical screening and colposcopy but no impact on the severity of disease outcomes.

Abstract

Objectives/Purposes of the study: To assess the impact of the COVID-19 pandemic on the cervical screening programme and colposcopy services in Northern Ireland.

Methods: All new patients referred to colposcopy following an abnormal cervical smear result from September to November 2019 and 2020 were included. Review patients and those referred to colposcopy for another indication in the same time frame were excluded. Data collected included the presenting smear result and the time to report, time interval to colposcopy review, cervical biopsy method, result and the time to report. Statistical analysis was performed using JASP (JASP V.0.16.1, 2022) and included Shapiro-Wilk normality test and Mann-Whitney U test to compare means.

Results: There was an 11% reduction in the number of presenting cervical smears (7155 vs 6379) in 2020 with a 46% reduction (158 vs 85) in the number of colposcopy referrals. In 2020 there was a mean increase of 6 days to report the presenting smear ($P<0.01$), mean decrease of 49 days to attend colposcopy ($P<0.01$) and a mean decrease of 36 days to report the cervical biopsy result ($P<0.01$). An increase of 14 days ($P= 0.01$) and 15 days ($P=0.01$) respectively to attend colposcopy for moderate and severe dyskaryosis in 2020. No statistical difference was seen in the frequency of presenting smear results, method of cervical biopsy and cervical biopsy results in 2020.

Conclusions: COVID-19 has had a significant impact on the number of patients referred to colposcopy and the time intervals in cervical screening but no significant short term impact on the severity of disease outcomes.

Key words

COVID-19, cervical screening, smear, HPV, colposcopy, cervical cancer

Introduction

Screening programmes are an important aspect of disease prevention worldwide through early detection of precancerous lesions in the asymptomatic population. In April 2020, in response to the COVID-19 pandemic, the Northern Irish government paused all routine invitations for the cervical screening programme. Only those who required non-routine screening (e.g., on request of colposcopy or the laboratory) were included in the screening programme.[1] The aim of this was to allow reallocation of funds and resources as well as reducing risk to invitees and staff.[2] Colposcopy services continued within certain health and social care trusts with reduced capacity due to PPE and infection control measures.[3,4] A phased return began in June 2020 and priority was given to those deemed high risk. Routine invitations were not recommenced until August 2020, starting with those who had been waiting the longest, resulting in a backlog of women waiting for screening invitations.[5] The screening programme suspension has raised concerns within the NHS and media that patients may have a delayed cervical cancer diagnosis or treatment delayed. [1,3]

The introduction of Human Papilloma Virus (HPV) testing along with cytology was rolled out in December 2019 to help identify high risk patients which has led to an increase in diagnostic accuracy,[5] and a reduction in the absolute disease burden. Persistent oncogenic HPV infection is the primary contributing factor to cervical cancer.[6] More specifically, HPV 16 and 18 contribute to 70% of cervical cancer cases worldwide and a further 10 to 12 HPV subtypes account for the remaining 30%.[6] Cervical screening is offered on a 3 yearly basis to women aged 25-49 and a 5 yearly basis for women age 50-64.[5] The cervical smear is primarily tested for HPV and, if positive, a cytological assessment is performed. It is based on this that a referral to colposcopy is made, if necessary.[2] Cervical cancer (rates, mortality, and morbidity) is now well below that of breast or colorectal cancer secondary to the introduction of the HPV vaccine.[4] HPV and COVID-19 have reagents in common within laboratory testing and therefore compete for limited resources.[4] The concern is that the temporary postponement of services will affect the success we are now seeing in relation to early

1. Dr. Josh Courtney McMullan, MBBch MRCOG, Northern Ireland Medical & Dental Training Agency (NIMDTA), Northern Ireland.

2. Dr. Laura Rainey, MBBch, NIMDTA, Northern Ireland.

3. Dr. David Morgan, MBBCH MRCOG, Antrim Area Hospital, Northern Health & Social Care Trust (NHSCT), Northern Ireland.

4. Dr. Lorraine Johnston, MBBCH MRCOG, Causeway Hospital, NHSCT, Northern Ireland.

Email: joshcmcmullan@doctors.org.uk
Correspondence to: Dr. Josh C McMullan

detection of cervical cancer which is only achieved through screening at regular intervals.[4,5] A negative screening result is only indicative of a low risk of developing disease[4] and relies on follow up screening to prevent progression.[4] It is felt that the postponement of the cervical screening program has the potential to disrupt the chain in cancer detection.[5]

Data was collected to assess the impact of the disruption to cervical screening within a health and social care trust in Northern Ireland in response to COVID-19 and to identify any delays in screening, diagnosis, and treatment. Numerous recovery strategies have been hypothesised to help recover from this potential delay in cervical screening including self HPV testing,[7] the use of telemedicine for risk assessment[8,9] and an age-related risk-based invitation to cervical screening.[4,6,7] Changes to recall intervals based on risk is another potential strategy to help manage any potential backlog in primary care which may be achievable given the role of HPV testing in identifying high risk patients. The World Health Organisation (WHO) set a global strategy to eliminate cervical cancer as a public health problem,[10] but this relies on screening 70% of women aged 35-45[11] with an estimated seven-fold increase in risk of cervical cancer in those who are unable or unwilling to attend for routine screening.[5] The current disruption in services affects two key pillars of this strategy - screening and timely treatment of detected disease.[10]

Methods

The setting was a health and social care trust in Northern Ireland serving a population of approximately 470,000 patients across 1733 square miles, making it the largest geographical health and social care trust within Northern Ireland. There are six consultant colposcopists accredited with The British Society of Cervical Pathology (BSCCP) as well as one cervical screening nurse specialist within the health trust.

A MEDLINE literature review was performed to assess the impact of COVID-19 on the cervical screening program. A retrospective cohort study was conducted of all patients within the health and social care trust described who were invited to colposcopy following an abnormal cervical smear result from September to November 2019. The same data was then collected for patients invited to colposcopy from September to November 2020, during the peak of COVID19. Patients who were already under review at colposcopy from a previous abnormal cervical smear result and those directly referred to colposcopy for another indication (e.g., clinically suspicious cervix) were excluded. The two cohorts were then compared, and statistical analysis performed. Data was collected using the Excelicare regional colposcopy database and the Northern Ireland Electronic Care Record (NIECR) and exported to Microsoft Excel (Excel V.16.59, 2022).

Data collected included patient demographics, date the presenting smear was collected, the presenting smear result, interval time to report presenting smear in days, interval time to attend colposcopy in days, colposcopists performing cervical biopsies, method of cervical biopsy, interval timing to report cervical biopsy in days and the cervical biopsy result.

Statistical analysis

Data was collected using Excelicare and exported to Microsoft Excel (Excel V.16.59, 2022). JASP software (JASP V.0.16.1, 2022) was then used to calculate descriptive statistics and the Mann-Whitney U test was used to compare the mean time results following the Shapiro-Wilk normality test which found the data to be non-gaussian in distribution. P values <0.05 were considered statistically significant.

Results

A total of 6379 cervical smear results were processed from September to November 2020 compared to 7155 in 2019 indicating an 11% reduction in the total number of cervical smears collected in 2020. Of those patients with an abnormal cervical smear result and therefore referred to colposcopy, 158 patients were included from 2019 and 85 patients from 2020 giving a total cohort of 243 patients. This is a 46% reduction in the number of patients referred to colposcopy with an abnormal cervical smear result in 2020 (See Figure I).

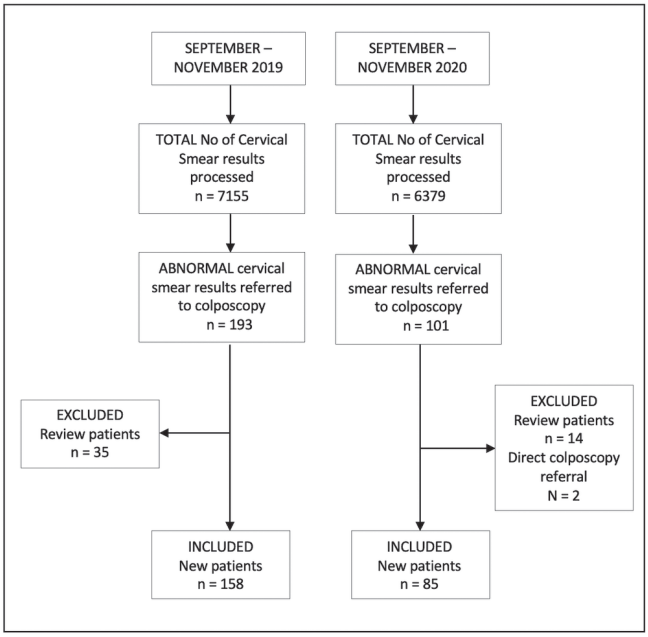

Figure I: Formation of the study cohort

Presenting Smear

The most common presenting smear result for both 2019 and 2020 was a borderline result with positive high-risk HPV. (See table IA). There was a 6.4% decrease (P 0.16) in moderate dyskaryosis results and a 9.1% increase (P 0.06) in severe dyskaryosis results in 2020 compared to 2019 but no statistical significance was found in the frequencies of individual presenting smear results.

The mean time from smear collection to colposcopy attendance for all smear grades in 2019 was 124 days (see table IB). For high grade results the mean time was much less, as moderate dyskaryosis, severe dyskaryosis and potential invasive disease had mean time intervals of 46 days, 56 days, and 25 days respectively (P <0.01). In 2020 the mean overall time interval from smear collection of all grades to colposcopy attendance was 75 days, showing a 40% overall decrease in mean time to colposcopy in 2020 (P <0.01), with mean time intervals for moderate dyskaryosis and severe dyskaryosis of 57 and 69 days respectively. There were no presenting smears with potential invasive disease identified in the 2020 cohort. This is a mean increase in time between smear collection and colposcopy review of 11 days and 13 days for moderate and severe dyskaryosis respectively between 2019 and 2020.

	Year			
Presenting Smear Results	2019	2020	P Value	Total
Borderline Changes	63 (39.9%)	34 (40%)	0.98	97
Glandular	2 (1.3%)	1 (1.2%)	0.95	3
HPV Only	1 (0.6%)	1 (1.2%)	0.65	2
Inadequate	2 (1.3%)	0 (0%)	-	3
Mild Dyskaryosis	42 (26.6%)	22 (25.9%)	0.91	65
Moderate Dyskaryosis	25 (15.8%)	8 (9.4%)	0.16	33
Negative	1 (0.6%)	1 (1.2%)	0.65	2
Severe Dyskaryosis	19 (12%)	18 (21.1%)	0.06	37
? invasive disease	3 (1.9%)	0 (0%)	-	3
Total	N = 158	N = 85	-	N = 243

Table IA: Presenting Smear. Results of presenting smears in September-November 2019 and 2020.

Presenting Smear	Time to report smear (days)		P-Value	Smear to Colposcopy Interval (days)		P-Value
	2019	2020		2019	2020	
Inadequate	27	N/A	N/A	214	N/A	N/A
Negative	28	38	0.3333	157	83	<0.0001
HPV Only	21	38	1	141	77	1
Mild Dyskaryosis	32.5	41.5	0.0051	160.5	68.5	<0.0001
Borderline Changes	36	39	0.7763	161	67.5	<0.0001
Moderate Dyskaryosis	21	35	0.0190	43	57	0.0098
Severe Dyskaryosis	21	33.5	0.0033	41	56	0.0083
Glandular	28	38	0.3333	40	49	0.3333
? Invasive Disease	17	N/A	N/A	28	N/A	N/A

Table IB: Presenting smear. Median time to report presenting smear (days) and median time interval from presenting smear to colposcopy review (days) in September-November 2019 and 2020.

Cervical Biopsy

The most common method of cervical biopsy was excisional biopsy in both 2019 (38%) and 2020 (43.5%). No statistical significance was seen between the method of cervical biopsies between 2019 and 2020 (see Table IIA). The most common cervical biopsy result for both 2019 and 2020 was cervical intraepithelial neoplasia (CIN) 1 however, a 6.5% increase of CIN 1 was seen in 2020. There was a 2.8% reduction of CIN2 and a 2.7% reduction of CIN3 in 2020 compared to 2019 but no statistical significance was found between the individual cervical biopsy results between 2019 and 2020 (See Table IIB).

	Year			
Method of Cervical Biopsy	2019	2020	P Value	Total
Directed Biopsy	55 (34.8%)	31 (36.5%)	0.7963	86
Excisional Biopsy	60 (38%)	37 (43.5%)	0.3991	97
Multiple directed biopsies	41 (25.9%)	14 16.5%)	0.0922	55
Other	2 (1.3%)	3 (3.5%)	0.2359	5
Total	N =158	N = 85		N = 243

Table IIA: Cervical Biopsy. Method of cervical biopsy at colposcopy in September-November 2019 and 2020.

	Year			
Cervical Biopsy	2019	2020	P Value	Total
CIN 1	53 (33.5%)	34 (40%)	0.3168	87
CIN 2	23 (14.6%)	10 (11.8%)	0.5446	33
CIN 3	45 (28.5%)	22 (25.8%)	0.6655	67
Cervical Cancer	1 (0.6%)	2 (2.4%)	0.2469	3
Cervicitis	1 (0.6%)	0 (0%)	-	1
Fibroid	0 (0%)	1 (1.2%)	-	1
HPV Only	9 (5.8%)	5 (5.8%)	0.9526	14
Inadequate	0 (0%)	1 (1.2%)	-	1
No CIN / HPV	25 (15.8%)	8 (9.4%)	0.0855	33
Polyp	1 (0.6%)	2 (2.4%)	0.6547	3
Total	N = 158	N = 85		N = 243

Table IIB: Cervical Biopsy. Results of cervical biopsies in September-November 2019 and 2020.

	Time to report biopsy (days)		Time to inform patient (days)	
	2019	2020	2019	2020
Median	36	10	6	5
Mean	50	14	10	7

	P
Time to report biopsy	< .001
Time to inform patient	0.004

Note. Mann-Whitney U test.

Table IIC: Cervical Biopsy. Time to report cervical biopsy (days) and time to inform patients of the result (days) in September-November 2019 and 2020.

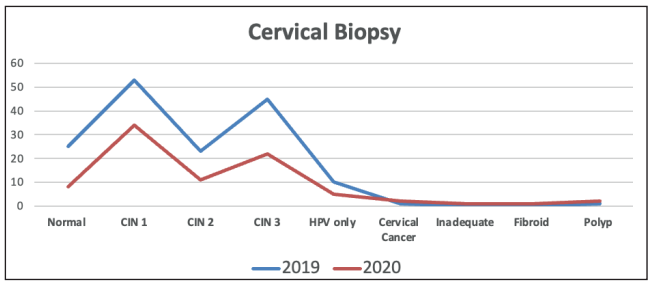

Figure II: Comparison of cervical biopsy results of patients attending colposcopy in September to November 2019 and 2020

Discussion

This retrospective cohort study identified a 46% reduction in the total number of colposcopy referrals following an abnormal cervical smear result during the COVID-19 pandemic with only 85 new patient referrals during the

3-month period at the peak of COVID-19 compared to 158 patients the previous year. This could be attributed to the postponement of routine invitations to the cervical screening programme with an 11% reduction in the overall total number of smears processed in 2020. This raises concern regarding the implications of delaying cervical screening within the asymptomatic population as it may lead to a reduction in early detection and treatment of cervical cancer. As stated above, the cervical screening programme success relies on at least 70% of women attending for cervical screening[11] and this data suggests that this was compromised during COVID-19. Not only does this affect the potential severity of disease in women attending colposcopy in the long term but also produces a backlog of women requiring routine screening following the reintroduction of the cervical screening programme.[4]

Primary and secondary care services are likely to struggle with capacity to facilitate the number of women requiring routine screening and colposcopy assessment if an abnormal result is obtained.[5] At a primary care level, reduced access to cervical screening services may arise because of the need to implement alternative services, including the vaccination programme, whilst trying to recover from existing difficulties. In secondary care, even if routine screening is increased to facilitate the backlog of patients, colposcopy services rely on trained accredited BSCCP colposcopists for which there are a limited number.[4] To train more BSCCP accredited colposcopists will take time and further resources and is not a short-term solution to address the potential backlog of patients following the reintroduction of routine cervical screening. Therefore, primary care, colposcopy services, and laboratory facilities in secondary care are likely to struggle to facilitate the increase in patients due to the reintroduction of routine screening.[5]

The most common presenting smear result both pre and during COVID-19 was a borderline result. The categorical data suggests that patients are more likely to present with severe dyskaryosis during the COVID-19 pandemic with a 9.1% increase and a 6.4% decrease in those presenting with moderate dyskaryosis. However, no statistical significance was found in the overall frequency of individual presenting smear results in 2020 compared to 2019 suggesting that there was no immediate impact on the severity of presenting disease following the postponement of the cervical screening program. Concern remains regarding the long-term effects on the success of the cervical screening programme which relies on screening the asymptomatic population at regular intervals to detect pre invasive disease.[5]

There was a mean increase of 6 days to report the presenting smear result but there was a significant reduction of 88 median days ($P<0.001$) in the time interval from cytologic recognition of an abnormality on the presenting smear and arrival at colposcopy in 2020 (152 median days 2019 to 64 median days 2020), representing over a 2-fold reduction in waiting times for colposcopy review. The concern lies, however, in the specific time delays for high grade smear results with an increase of 14 days ($P = 0.01$) and 15 days ($P = 0.01$) for moderate and severe dyskaryosis respectively to attend colposcopy in 2020. This has the potential to impact the treatment pathway for patients as high grade results require timely assessment and treatment to prevent invasive disease. Furthermore, there was a reduction of 36 mean days to report the cervical biopsy results in 2020 ($P<0.001$). This could have a positive impact on the overall patient experience with a reduction in patient anxiety in response to receiving an abnormal cervical smear result. This also ensures timely investigation and diagnosis of cervical disease in 2020 during COVID-19.

To our knowledge most of the published literature on the impact of COVID-19 on the cervical screening programme is international and provides service provision strategies to prevent harm from the postponement of services due to COVID-19 based on a hypothetical harm caused. This study assessed the impact of the postponement of the cervical screening program within a large United Kingdom (UK) health and social care trust and therefore gives insight into the potential effects on patients requiring colposcopy services. There is limited data in the literature on the affects and potential difficulties for the future within the UK and this study is the first within a Northern Irish population. Limitations of this study include the relatively small numbers overall and the follow up time, as only those patients during the peak of COVID-19 were captured. More work is needed in the years following the recovery from COVID-19 and the reintroduction of the cervical screening programme to assess the long-term impact of the potential backlog of patients,[4] waiting times and severity of disease outcomes.

Conclusion

COVID-19 has infiltrated every health care service within the UK and the cervical screening programme has not been immune to this. The cervical screening program within the UK has been praised for its success with the absolute disease burden of cervical cancer being well below that of breast and colorectal cancer.[4] The postponement of routine cervical screening because of COVID-19 poses significant risk to this success which relies on screening at regular intervals to prevent patients presenting with advanced disease.[5] Not only is there now a risk of patients with high grade disease having a longer waiting time for colposcopy review, but there is also a predicted increase in the number of patients who will require routine screening, producing a potential backlog of patients.[4] As stated previously, numerous recovery strategies have been suggested to help aid the recovery from this temporary delay in cervical screening. These include self HPV testing,[7,9] which has a higher negative predictive value than cytology,[4] the use of telemedicine,[8,9] and age-related risk-based strategies.[4,7] A risk-based strategy seems to be the most effective option for the cervical screening program to recover [4,7] and would include inviting patients deemed to be at highest risk of developing cervical cancer first and

extending the screening interval for those women at lower risk thereafter. [4,12]

Abbreviations

HPV = Human Papillomavirus

WHO = World Health Organisation

BSCCP = The British Society of Colposcopy and Cervical Pathology

NIECR = Northern Ireland Electronic Care Record

CIN = Cervical Intraepithelial Neoplasia

REFERENCES

1. Department of Health. Temporary pause of routine screening programmes. [Internet]. Belfast: Department of Health; 2020. (cited 2023 Feb 27). Available from: https://www.health-ni.gov.uk/news/temporary-pause-routine-screening-programmes
2. NI Direct. Cervical screening. [Internet]. (cited 2023 Feb 27). Belfast: NI Direct Government Services; 2022. (cited 2023 Feb 27). Available from: https://www.nidirect.gov.uk/articles/cervical-screening
3. Campbell C, Sommerfield T, Clark GR, Porteous L, Milne AM, Millar R, *et al*. [Internet]. COVID-19 and cancer screening in Scotland: A national and coordinated approach to minimising harm. *Prev Med*. 2021; 151:106606. doi: 10.1016/j.ypmed.2021.106606.
4. Castanon A, Rebolj M, Burger EA, de Kok IMCM, Smith MA, Hanley SJB, *et al*. [Internet]. Cervical screening during the COVID-19 pandemic: optimising recovery strategies. *Lancet Public Health*. 2021; 6(7):E522-E527. (cited 2023 Feb 27) doi.org/10.1016/S2468-2667(21)00078-5
5. Castanon A, Rebolj M, Pesola F, Sasieni P. Recovery strategies following COVID-19 disruption to cervical cancer screening and their impact on excess diagnoses. *Br J Cancer*. 2021; 124(8):1361–5.
6. Doubeni CA, Gabler NB, Wheeler CM, McCarthy AM, Castle PE, Halm EA, *et al*. Timely follow-up of positive cancer screening results: a systematic review and recommendation from the PROSPR consortium. *CA Cancer J Clin*. 2018; 68(3):199-216.
7. Landy R, Castanon A, Hamilton W, Lim AWW, Dudding N, Hollingworth A, *et al*. Evaluating cytology for the detection of invasive cervical cancer. *Cytopathology*. 2016; 27(3):201–9.
8. Mancebo G, Solé-Sedeño JM, Membrive I, Taus A, Castells M, Serrano L, *et al*. Gynecologic cancer surveillance in the era of SARS-CoV-2 (COVID-19). 2021; 31(6):914-9.
9. Gupta N, Chauhan AS, Prinja S, Pandey AK. Impact of COVID-19 on Outcomes for Patients With Cervical Cancer in India. *JCO Glob Oncol*. 2021;7(7):716–25.
10. World Health Organization. [Internet]. WHO leads the way towards the elimination of cervical cancer as a public health concern. Geneva: World Health Organization; 2018. [cited 2023 Feb 27]. Available from: https://www.who.int/news/item/11-09-2018-who-leads-the-way-towards-the-elimination-of-cervical-cancer-as-a-public-health-concern
11. Poljak M, Cuschieri K, Waheed DE, Baay M, Vorsters A. Impact of the covid-19 pandemic on human papillomavirus–based testing services to support cervical cancer screening. *Acta Dermatovenerol Alp Pannonica Adriat*. 2021;30(1):21–6.
12. Wentzensen N, Clarke MA, Perkins RB. Impact of COVID-19 on cervical cancer screening: Challenges and opportunities to improving resilience and reduce disparities. *Prev Med (Baltim)*. 2021; 151:106596. doi: 10.1016/j.ypmed.2021.106596.