ECRONICON OPEN ACCESS

EC DENTAL SCIENCE
Research Article

Assessment of Most Common Patient Concerns in Oral Radiology Clinics

Shahad Baheydrah[1]*, Khadeja Bukhari[2], Emad Khan[3]* and Dimah Faydhi[2]

[1]General Dentist, King Abdulaziz University Dental Hospital, Jeddah, Saudi Arabia

[2]General Dentist, Private Practice, Jeddah, Saudi Arabia

[3]Assistant Professor, Consultant of Oral and Maxillofacial Radiology, ODS Department, Faculty of Dentistry, King Abdulaziz University, Jeddah, Saudi Arabia

***Corresponding Author:** Shahad Baheydrah, General Dentist, King Abdulaziz University Dental Hospital, Jeddah, Saudi Arabia.

Received: March 09, 2020; **Published:** March 20, 2020

Abstract

Patients have different concerns regarding dental X-rays, such as the risk of radiation in adults, children, and particularly pregnant women. Furthermore, anxiety, discomfort, and the gagging reflex while having radiographs taken are significant aspects of dental treatment. This study aimed to assess the concerns of patients in oral radiology clinics at King Abdulaziz University, Jeddah, Saudi Arabia. A cross-sectional study design used a supervised questionnaire to interview oral radiology clinic patients. The majority of the patients (85%) showed no concerns at all. Only 10% of the respondents had an overall concern about X-rays, regardless of the source. Ranking those concerns from the most to the least common concerns, the results were that repetition of radiographs in one session was the most frequently cited concern, followed by the duration of the session, infection control, and radiograph diagnosis, with all four being rated by between 22% and 26% of the respondents. The study concluded that any correlation of age, gender, or level of education with the current level of concern was relatively weak.

Keywords: *Oral Radiology; Concerns; Assessment; Fear; Dental Radiology; Radiography*

Abbreviations

ODS Department: Oral Diagnostic Sciences Department; CT: Computed Tomography; CBCT: Cone Beam Computed Tomography

Introduction

Radiography is a clinical procedure performed worldwide on a regular basis for diagnostic purposes. In the dental field, a radiograph is the most common indispensable diagnostic tool for obtaining the best treatment outcomes [1]. The level of radiation exposure correlated with dental radiography is quite low when compared to the exposure from other radiographic examinations. Nonetheless, it is essential to optimize any radiological procedure to reduce the risk to health [2]. Patients have numerous concerns about dental X-rays, primarily regarding the risk from radiation for adults, children, and specifically, pregnant women, but also including anxiety, discomfort, and the gagging reflex while taking radiographs. However, radiographs are a significant aspect of dental treatment.

A study conducted in the state of Ohio in the United States in 2007 compared patient and dentist opinions on the safety, accessibility, and necessity of dental care during pregnancy. Strafford., *et al.* reported that 14% of women felt that dental visits are unsafe during pregnancy and found that dental X-rays were the most commonly withheld treatment among the 105 patients in the study who had sought dental care. The study suggests the need to improve patient perceptions and understanding of the safety of prenatal dental care by increasing patient and provider awareness of existing evidence [3].

In an attempt to identify the influencing factors of pediatric dental anxiety levels in an undergraduate dental clinic in Cairns, Australia, a study was conducted by Mahiepala., *et al.* in 2015. The researchers assessed 125 participants using questionnaires, and the cross-sectional

descriptive study suggested that dental anxiety levels were significantly higher in patients subjected to radiographic examinations as part of their dental treatment [4].

Another study reported varying degrees of patient discomfort during dental X-rays using digital receptors and films, which suggests that identifying the origin of patient concern may enhance and improve patient management and provide optimal care [5].

In addition to varying patient concerns that need to be managed to improve dental treatment and clinical management, patient satisfaction is a valuable issue in the radiology clinic. A cross-sectional study conducted at Ohio State University Medical Center in 2013 examined the importance of patient satisfaction in the dental clinic, which comprised 30% of the hospital's performance score. The ratings included practitioner communication, pain management, and overall impression through survey questions regarding proper registration, fair facilities, good personal issues and overall assessment [4]. Other studies have demonstrated that improved communication skills among practitioners can help increase patient satisfaction, with the results of one study showing that more patients returned surveys after practitioner training in communication [6].

Despite the growing trend toward studying patient concerns in the dental clinic, no studies have looked specifically at patient concerns in a dental radiology clinic.

Aim of the Study

This study aimed to assess the baseline concerns of patients in oral radiology clinics.

Materials and Methods

Ethical approval

This study was approved by the Research Ethics Committee of King Abdulaziz University-Faculty of Dentistry, Jeddah, Saudi Arabia, with Proposal No.022-01-17.

Study sample

The target population was adult patients (18 years or older) and parents/guardians of younger patients attending oral radiology clinics at King Abdulaziz University Dental Hospital. It was a descriptive cross-sectional study using a supervised questionnaire (interview) for oral radiology clinic patients. The questions were constructed using a focus group of an oral radiologist and two general dentists along with a pilot study with 10 patients. The questionnaire was formulated in both Arabic and English (before the pilot study).

The suggested concerns were:

1. General fear or anxiety around dental clinics.
2. Concerns about pain resulting from radiographs being taken.
3. Concerns about cancer risks.
4. Concerns about gagging and throwing up.
5. Concerns about lack of radiographic hygiene.
6. Concerns about repeating radiographs in the same session.
7. Concerns about findings and diagnosis.
8. Concerns about session duration.
9. Concerns about technician behavior.

Each concern or source of concern was rated on a five-point Likert scale. After data collection, an overall perception/prevalence of each concern was measured. For each statement/source of concern, the mean and median of answers were computed.

Data were analyzed using IBM SPSS statistical package (version 22; IBM Corp., Armonk, NY, USA). The analysis was conducted under a 95% confidence level, at a 0.05 level of significance (alpha), and a 5% sampling error. A correlation test was conducted to investigate the effect of the existence of a certain concern in a previous radiographic experience on the level of concern about the same source in the current experience.

A chi-square test of independence (relationship existence) was conducted between the levels of concern for each source and some identified variables to see if the variation in these factors was causing a significant difference in concern level.

Results

The data analyzed in this study were not extracted from an existing data set; they were collected using the questionnaire that included questions based on the variables to be studied. A focus group was formed by the research team to create a foundation for the study, starting with identifying the goals that the research was intended to achieve, then structuring a plan of how to reach those goals. A step-by-step implementation of the research, how and where data gathering and analyses were to be done, and finally, what methods were to be used and why were all discussed in the group meetings. This section examines what the focus group planned and what was then applied are examined.

As a first step before any type of study, the population to be studied must be determined and all the characteristics and features of that population must be narrowed down in order to choose the proper representative sampling technique, which relies on the population distribution from which the sample is being drawn.

Variables represented by the data were connected directly to the concerns and factors of interest to be studied for their effect upon patient concerns in radiology. Importantly, variables were chosen carefully, ensuring they could precisely answer the factor being measured. In addition, some factors were measured for the purpose of examining sample features. Ultimately, 26 variables were selected for this research, as follows.

Demographic variables included gender, age, citizenship, and level of education. Age was added to differentiate between pediatric and adult patients. The citizenship variable was included for certain results based on population characteristics and this variable is depicted in figure 1. A participant's previous experience was added as a discriminant tool and included the type of previous radiographic experience, if available, and whether a problem occurred during that previous session. Some of these variables were also studied further as factors affecting concerns.

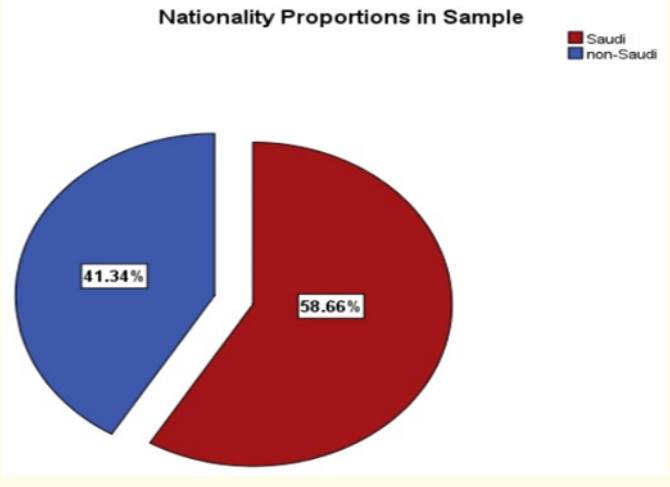

Figure 1: *Nationality Proportions in in the sample population.*

Respondents with previous experience with radiographs were asked to identify and rate the concerns they had previously, and all patients were asked to rate and analytically assess their concerns in the areas under study. The two last variables in the questionnaire were completed by participants after undergoing the radiographic tests, when they were asked whether their level of concerns had changed or if they had any additional concerns.

Sample characteristics are presented as a proportion of variable levels, and they were tested for proportionality to investigate the differences between groups and determine whether they supported the observed conclusions. Note that all proportions documented are descriptive only for the sample in this study and do not represent equal proportions in the general population unless tested and proven otherwise.

A total of 179 responses to the questionnaire were collected over a two-month period in February and March of 2017. A majority of the respondents (68.2%) were females between the ages of 18 and 71, while the remainder (31.8%) were males between the ages of 18 and 74. The average age of all respondents was 35.41 ± 1.046. The data also represent respondents with different levels of education, as shown in figure 2.

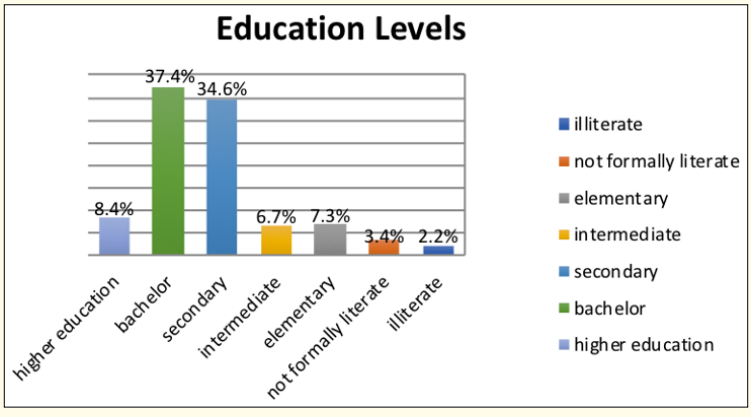

Figure 2: *Distribution of educational levels achieved in the sample population.*

There were no statistically significant differences between the concerns of patients and various levels of education, either generally or among each type. The correlation between age and level of concern was relatively weak; however, the average level of concerns was significantly different between males and females, with females exhibiting more concerns than males.

Among all the respondents, 76.5% had previous radiographic experience, and of that group, 13.2% had faced problems during their prior experience. Table 1 provides a cross-tabulation between the type of radiograph and the problem that occurred during the patients' previous radiographic experiences.

Type of previous radiograph		Had problems	Have not had problems
1	CT-CBCT	0	2
2	Extraoral	10	58
3	Intraoral	17	85

Table 1: *Cross tabulation between the type of radiograph and the problem occurrence during sessions.*
Notes: CT: Computed Tomography; CBCT: Cone Beam Computed Tomography.

A test of independence was conducted to see whether the probability of concerns about facing problems in a radiographic session was significantly higher for certain types of radiographs. The difference was insignificant (p-value = .101), indicating that the radiograph type was not related to problems occurring during prior sessions.

As can be seen in table 2, there were, overall, minimal concerns among the respondents, with a mean of 1.24 indicating a neutral condition with a tendency toward a complete lack of concerns. Taking into consideration the standard error of the mean would not result in a departure from that result, and in fact, it might only reinforce the lack of significance. However, with the standard deviation of .603, the values of responses could potentially extend to 2.406, indicating that there were some areas of concern. This is made clearer by reviewing the overall distribution of levels of concern, with about 10% of the respondents indicating some concern, regardless of the source, and about 85% having no concerns at all. At first look, each source of concern on its own appeared to be neutral. However, some sources of concern had a neutral condition with the tendency for the concerns to be nonexistent, while other sources of concern had the neutral condition with the opposite tendency such that where they existed, they could be valid and affective.

Source of concern	Mean**	SE mean	SD	Median*	IQR
Fear/anxiety	1.22	.044	.595	1	0
Pain	1.31	.053	.713	1	0
Cancer hazard	1.35	.054	.722	1	0
Gagging	1.21	.043	.570	1	0
Infection control	1.53	.064	.850	1	1
Repetition of radiograph	1.55	.065	.875	1	2
Diagnosis	1.54	.063	.843	1	1
Duration	1.61	.065	.870	1	2
Technician behavior	1.25	.047	.623	1	0
Total (overall concerns)	1.24	.045	.603	1	

Table 2: *Disruption of different overall concern sources among patients with no previous Radiographic experience.*

**For median values: 1: Not at all concerned, 2: Neutral, 3: Concerned. **For mean values: 0-1: Not at all concerned, 1-1.5: Neutral but almost not concerned, 1.5-2: Neutral but almost concerned, 2-3: Very concerned. SE: Standard error; SD: Standard deviation; IQR: Interquartile range.*

Duration of radiograph, repetition in one session, infection control, and diagnosis were the sources of concern with neutral conditions that tended to be more valid and at a high level. For those four sources, considering the standard error of the mean would not cause a significant variation of average measures. However, the standard deviations were high enough to indicate the existence of responses with extreme opinions toward either no concerns at all or very high levels of concern. Ranking those concerns from the most frequently rated/most common concern, repetition of radiographs in a single session had the highest rate, followed by duration of session, infection control and radiograph diagnosis. All four sources had ratings between 22% and 26%. The ranking of the levels of concern per source of concern is shown in table 3.

	Concern level			
Source of concern	Not concerned	Neutral	Concerned	Rank
Fear/anxiety	86.6%	4.5%	8.9%	8
Pain	83.2%	2.2%	14.5%	6
Cancer hazard	79.3%	6.1%	14.5%	5
Gagging	86.6%	5.6%	7.8%	9
Infection control	70.9%	5.6%	23.5%	3
Repetition of radiograph	70.4%	3.9%	25.7%	1
Diagnosis	68.7%	4.8%	22.9%	4
Duration	64.8%	9.5%	24.7%	2
Technician behavior	85.5%	4.5%	10.1%	7

Table 3: *Distribution of sources of concerns across levels of concern among patients with previous experiences.*

Fear/anxiety and experience of a gagging sensation had the lowest averages with the indication of a neutral condition tending toward those concerns being nonexistent. The standard deviations of both sources of concern were somewhat low but could indicate a few very high or low responses. Table 4 shows the distribution of all sources of concern, with the proportions shown indicating the frequency with which each source of concern was rated at a certain level. The proportions might also be considered the probability of a patient having that certain source of concern at that exact level.

Source of concern	Mean	SE mean	SD	Median	IQR
Fear/anxiety	1.40	.103	.728	1	1
Pain	1.54	.122	.826	1	1
Infection control	1.72	.131	.927	1	2
Radiograph repetition	2.02	.138	.979	2	2
Diagnosis	1.62	.121	.855	1	1
Duration	1.86	.131	.926	1	2
Technician behavior	1.36	.106	.749	1	0
Total (overall concerns)	1.29	.048	.558	1	

Table 4: *Distribution of all sources of concern and its frequency with each source in patients with Previous Radiographic experience.*
SE: Standard Error; SD: Standard Deviation; IQR: Interquartile Range.

There was an overall condition of neutral concern during previous experiences of radiographs, with a relatively small standard deviation that, together with the median value, indicates there was a very low frequency of responses with an extreme opinion or no concern at all.

Fear/anxiety and technician behavior also revealed a general condition of neutral concern with the tendency toward not having those concerns at all in previous experiences. However, both sources of concern had a relatively high standard deviation, which indicates a great spread of opinions and/or concern levels among the respondents. The rest of the sources of concern exhibited equal or higher standard deviations, which also indicates a spread over the whole scale of concerns. However, the average level of concern in these other sources points to an overall neutral condition with the tendency of the concerns being valid and affective. In other words, it indicates that respondents in the sample had a variety of concern levels in their previous experiences, where some were extremely concerned, others were not at all concerned and some were neutral.

The only source of concerns with a high average was radiograph repetition, with an average of 2.02, indicating that it was a source of a valid and affective concern in previous experiences among respondents in the sample. However, it still showed a high standard deviation, indicating a variety of opinions and a large spread over the levels of concern scale. This means that just as there were some patients in the sample with a high level of concern about radiograph repetition, there were some patients who were not at all concerned about it, and some might have been neutral. Figure 3 shows the distribution of sources of concerns across levels of concern among patients with previous experiences.

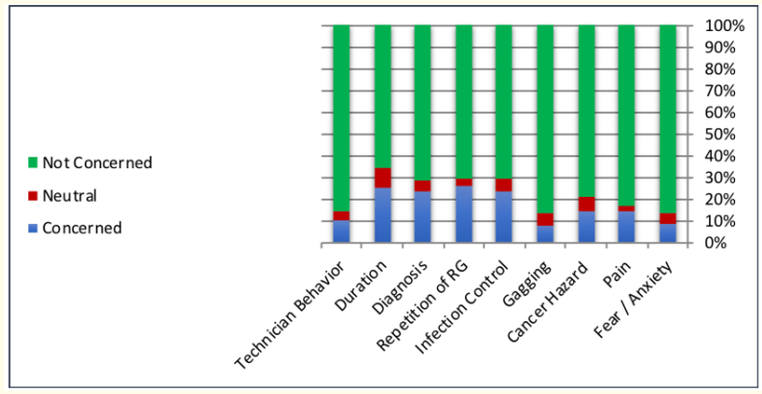

Figure 3: *Distribution of levels of concern for specific types of concerns among the sample population.*

Respondents in the sample with previous experiences with radiographs were asked if they had thrown up or almost thrown up during that experience and whether they had repeated radiographs in the same session. About one-third (36.5%) said they had repeated radiographs in the previous session, and 16.1% had thrown up or almost thrown up during the previous session.

Source of problem in previous radiograph experience	Yes	No
Throwing up	16.1%	83.9%
Repeated radiograph	36.5%	63.5%

Table 5: *Sources of concerns in previous radiographic experiences and their distributions.*

Because previous sources of concern and the distribution and number of experiences might have an effect on current concern levels, this was measured as well. Table 6 shows the measures of association/correlation between previous and current concerns.

Tested sources of concerns			Correlation value
Fear/anxiety in previous visit	vs.	Fear/anxiety in current visit	.877*
Pain in previous visit	vs.	Pain in current visit	.893*
Infection control in previous visit	vs.	Infection control in current visit	.949*
Diagnosis of previous visit	vs.	Diagnosis of current visit	.882*
Duration of previous visit	vs.	Duration of current visit	.872*
Technician behavior in previous visit	vs.	Technician behavior in current visit	.907*
Throwing up in previous visit	vs.	Throwing up in current visit	.763*
Repeating radiograph in previous visit	vs.	Repeating radiograph in current visit	.500*
Overall concerns in previous visit	vs.	Overall concerns in current visit	.671*

Table 6: *Correlation between previous and current concerns.*

As can be seen, respondents who had prior concerns were more likely to have them again with regard to their current radiograph. This means that the levels of concern for each source, as well as for overall concerns related to radiography, could be affected by previous experiences.

The average level of concern was significantly different between those who had previous experiences and those who did not (p-value = .025), where those who had previous experiences were less concerned than those without prior experience. Reviewing this result with each type of concern individually revealed that the variation of concern level significance came in the areas of duration of radiograph, diagnosis and repetition, where the patients with previous experience were less concerned about each variable. The other types of concern revealed the same levels of concern among patients with and patients without previous experience.

When comparing male and female respondents, the average level of concern was significantly different between those who had previous experience and those who have not (p-value = .130), where females had more concerns than males. Reviewing this result with each type of concern individually revealed that the variation of concern level significance came from the areas of infection control and repetition of radiographs, where the patients with previous experience were less concerned. The other types revealed the same levels of concern in both male and female patients.

There were no statistically significant differences between the average concern of patients with different levels of education, either overall or for each type of concern. This indicates that all patients, whether they had previously experienced difficulties or not, had the same levels of concerns that, when tested, were determined to be nonexistent.

The correlation between age and the level of concern was relatively weak, yet significant for overall concerns as well as for some sources of concerns, specifically pain, cancer hazard, repetition of radiograph, and technician behavior, where the older a patient was,

the less concerned they were about these sources or about radiographs generally. Table 7 shows the p-values resulting from Pearson correlation tests conducted between age and each concern level, along with the correlation coefficient values.

Concern	P-value	Correlation coefficient (r)
Fear/anxiety	.715	0.027
Pain	.021*	−0.173
Cancer hazard	.025*	−0.167
Gagging	.147	0.109
Infection control	.488	−0.052
Repetition of radiograph	.000*	−0.258
Diagnosis	.449	−0.057
Duration	.378	−0.066
Technician behavior	.006*	−0.205
Overall current concerns	.020*	−0.174

Table 7: *Correlation between age and the level of concern.*

The type of radiograph patients with prior experience had taken was not affective over the level of current concerns, either overall or for each source of concern individually. The majority of patients (82.1%) indicated that their concerns about radiographs remained the same after their current experience, and 12.29% said their concerns increased, as shown in figure 4. After the current radiographic experience, 14% of the patients had new/additional concerns that they did not have before the radiographs were taken.

Discussion

Although the use of ionizing radiation has become more common in dental clinics in recent years due to a variety of benefits, there are still concerns about their potential negative effects. Past studies have found a correlation between ionizing radiation exposure and several cancer types, and this type of radiation has also been associated with childhood leukemia [7]. There is typically a low level of knowledge among dentists about these health risks, with earlier studies indicating that most dentists do not know the risks involved with this type of radiation [8-10]. To the best of our knowledge, there have been no studies done around the world about patient concerns regarding dental radiography. Thus, the present study first sought to assess the baseline concerns of patients in oral radiology clinics.

For the current study, potential participants were contacted with a unique questionnaire designed and administered for this study and consisting of 20 questions that incorporated demographic measures, as well as variables relating to qualifications and education. The study found substandard knowledge and awareness among the respondents, and the correlation between age or educational level and the level of concern was relatively weak. However, there was a significantly higher level of interest among females regarding infection control and radiograph repetition than among males. The results of this study confirm that much work must be done in order to improve the knowledge and awareness of patients about dental radiography.

While this study highlights the inadequacy of patient knowledge and practices, further research should be conducted looking at strategies for improving dental radiography awareness. The significance of this research is that it identifies a widespread lack of awareness about dental radiography, particularly with regard to unnecessary exposure to hazards that could be prevented by implementing current safety precautions. Also, in addition to providing new baseline data in the literature, this study highlights the need for further research into ways to educate patients and enforce higher standards to ensure awareness about dental radiography hazards.

Conclusion

The present study revealed that there is an overall condition of minimal or no concern among respondents, with only a weak correlation between age or educational level and the level of concern. However, there was a significantly higher level of interest among females regarding infection control and radiograph repetition than there was among the males.

Conflict of Interest

The authors declare there are no conflicts of interest.

Bibliography

1. American Dental Association. Radiation-Emitting Products. The Selection of Patients for Dental Radiographic Examinations (2012).
2. Preston RJ., *et al*. "Uncertainties in Estimating Health Risks Associated with Exposure to Ionizing Radiation". *Journal of Radiological Protection* 33.3 (2013): 573-588.
3. Strafford KE., *et al*. "Provider and Patient Perceptions about Dental Care During Pregnancy". *The Journal of Maternal-Fetal and Neonatal Medicine* 21.1 (2008): 63-71.
4. Mahiepala NA., *et al*. "Influencing Factors of Paediatric Dental Anxiety Levels in an Undergraduate Dental Clinic". *European Journal of Paediatric Dentistry* 16.2 (2015): 159-162.
5. Wenzel A., *et al*. "Patient Discomfort and Cross-Infection Control in Bitewing Examination with a Storage Phosphor Plate and a CCD-Based Sensor". *Journal of Dentistry* 27.3 (1999): 243-246.
6. Lang EV., *et al*. "Understanding Patient Satisfaction Ratings for Radiology Services". *American Journal of Roentgenology* 201.6 (2013): 1190-1196.
7. Timins JK. "Communication of Benefits and Risks of Medical Radiation: A Historical Perspective". *Health Physics* 101.5 (2011): 562-565.
8. Al-Khatib IA., *et al*. "Dentists' Perceptions of Occupational Hazards and Preventive Measures in East Jerusalem". *Eastern Mediterranean Health Journal* 12.1-2 (2006): 153-160.
9. Shahab S., *et al*. "Compliance of Iranian Dentists with Safety Standards of Oral Radiology". *Dentomaxillofacial Radiology* 41.2 (2012): 159-164.
10. Ilgüy D., *et al*. "Research Survey of Dental Radiological Practice in Turkey". *Dentomaxillofacial Radiology* 34.4 (2005): 222-227.

Volume 19 Issue 4 April 2020