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Early Impact of COVID-19 Pandemic on Paediatric Surgical Practice in Nigeria.

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TITLE PAGE

Title:

Early Impact of COVID-19 Pandemic on Paediatric Surgical Practice in Nigeria.

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ABSTRACT

Introduction The novel Coronavirus disease has had significant impact on healthcare globally. Knowledge of this virus is evolving, definitive care is not yet known, and mortality is increasing. We assessed its initial impact on paediatric surgical practice in Nigeria, creating a benchmark for recommendations and future reference.

Methods Survey of 120 paediatric surgeons from 50 centres to assess socio-demographics and specific domains of impact of COVID-19 on their services and training in Nigeria. Seventy four surgeons adequately responded. Responses have been analysed. Duplicate submissions for centres were excluded by combining and averaging the responses from centres with multiple respondents.

Results Forty-six (92%) centres had suspended elective surgeries. All centres continued emergency surgeries but volume reduced in March by 31%. Eleven (22%) centres reported 13 suspended elective cases presenting as emergencies in March, accounting for 2.7% of total emergency surgeries. Nine (18%) centres adopted new modalities for managing selected surgical conditions: non-operative reduction of intussusception in 1(2%), antibiotic management of uncomplicated acute appendicitis in 5(10%), more conservative management of trauma and replacement of laparoscopic appendectomy with open surgery in 3(6%) respectively. Low perception of adequacy of Personal Protective Equipment (PPE) was reported in 35(70%) centres. Forty (80%) centres did not offer telemedicine for patients follow up. Twenty-nine (58%) centres had suspended academic training. Perception of safety to operate was low in 37(50%) respondents, indifferent in 24.3% and high in 25.7%.

Conclusion Majority of paediatric surgical centres reported cessation of elective surgeries whilst continuing emergencies. There is however an acute decline in the volume of emergency surgeries. Adequate PPE need to be provided and preparations towards handling backlog of

elective surgeries once the pandemic recedes. Further study is planned to more conclusively understand the full impact of this pandemic on children's surgery.

Key words: pandemic, COVID-19, children's surgery.

Key Messages

Anecdotal evidence suggests that elective surgeries in children have been suspended due to COVID-19 pandemic.

Our study shows that most centres have suspended elective surgeries. All centres continued emergency surgeries but the volume reduced by 31% in March 2020. Moreover, 2.7% of the emergency surgeries were suspended elective cases presenting as emergencies.

Almost 20% of centres have newly adopted non-operative modalities for managing selected emergency surgical conditions.

This data shows an urgent need for consensus guidelines for emergency services and protocols for handling backlog of elective surgeries in children once the pandemic recedes. Outcome of the modifications in treatment may be subject to future research.

BACKGROUND

Corona virus disease 19 (COVID-19) is a highly transmissible novel viral illness, caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (1). It was reported to have emerged in Wuhan, China, in December 2019 but later spread to other parts of China and other countries of the world (2). This disease poses a huge challenge to health care systems around the world. The U.S. Department of Health and Human Services stated in its 2017 Pandemic Influenza plan update that "emerging viral pandemics can place extraordinary and sustained demands on public health and health systems and on providers of essential community services" (3). The effect may be more profound in regions with already limited resources and fragile health infrastructure. The aim of this study was to carry out a survey of paediatric surgeons in a resource limited setting to assess early effects of the COVID-19 pandemic on their practice in the initial stages of the outbreak. Data obtained would be used for recommendations and future reference.

METHODS

Relevant information was obtained from paediatric surgeons (consultants and senior registrars) currently practising in Nigeria, using a pre-tested questionnaire designed on Microsoft Word version 10 (Microsoft Seattle, WA, USA) and transcribed to google form. The questions were based on 5-point Likert scale (Strongly agree, agree, neither agree nor disagree, disagree, strongly disagree). We circulated the forms to the predetermined group of specialists by email and online chat rooms and kept them open from 10th to 17th April 2020. Daily reminders were also sent.

Participants were required to provide socio-demographic data, information on patient traffic and decision on management of specific conditions, availability of PPE, impact on surgeon's psyche, their academic programs and institutions infrastructure.

A total of 120 paediatric surgeons were sent the survey. Eighty-three paediatric surgeons responded but 74 were adequately completed. For the purpose of analysis, the 5-point Likert scale was reduced to 3 points (Agree, neutral, disagree).

Duplicate submissions for centres were excluded by combining and averaging the responses from centres with multiple responses.

Responses were analysed using SPSS version 22 and presented as categorical data and percentages.

Patient and Public Involvement statement: This research was done without patient involvement. Patients were not invited to comment on the study design and were not consulted to develop patient relevant outcomes or interpret the results. Patients were not invited to contribute to the writing or editing of this document for readability or accuracy.

Ethics Approval: Obtained from the Health Research Ethics Committee of Olabisi Onabanjo University Teaching Hospital, Sagamu, Ogun State, Nigeria.

RESULTS

Demographics

The response rate was 74(61%). The 74 completed responses represented 50 centres across the country with 62 (83.8%) Males and 12 (16.2%) Females; 45(60.8%) consultants and 29(39.2%) senior registrars. Forty-eight (96%) centres are public owned health facilities while 2(4%) are privately owned; 39 (78%) are teaching hospitals, 10(20%) federal medical centres (tertiary

hospitals not affiliated to universities) and 1(2%) specialist hospital. Table 1 shows the demographic characteristics of respondents.

Table: 1 Socio-demographic characteristics of respondents

Characteristics of respondents	Scores N=74	Percentage
1.Cadre		
Consultant	45	60.8
Senior-Registrar	29	39.2
2.Gender		
Male	62	83.8
Female	12	16.2
3.Work place	N=50	
Public	48	96
Private	2	4
4.Type of Health facility	N=50	
Teaching hospital	39	78
Federal Medical Centre	10	20
General/Specialist Hospital	1	2

Impact on Surgeries

Elective surgeries had been suspended in 46(92%) centres at the time of this survey. There was a steady decline in the average number of elective surgeries done over 5 months between November 2019 with 993(24.8%) and March 2020 with 420(10.5%) cases. Similar trend was

observed with emergency surgeries which reduced from 822(24.9%) in November 2019 to 485(14.7%) in March 2020 as shown in table 2. Comparatively, there were more elective than emergency surgeries per month until March (Figure 1).

Table 2: Distribution of mean number of surgeries done in the last five months

Month	Emergency surgeries Mean x No of centers N (%)	Elective surgeries Mean x No of centers N (%)	Total
Nov 2019	822 (24.9)	993 (24.8)	1815 (49.7)
Dec 2019	688 (20.9)	939 (23.4)	1627 (44.3)
Jan 2020	685 (20.8)	864 (21.5)	1549 (42.3)
Feb 2020	615(18.7)	793(19.8)	1408 (38.5)
Mar 2020	485 (14.7)	420 (10.5)	905 (25.2)
Total	3295(100)	4009(100)	7304(200)

Eleven (22%) centres reported at least one suspended elective case presenting as emergency in March. There were 13 of such patients accounting for an estimated 2.7% of the total emergency surgeries. They included incarcerated inguinoscrotal hernias (10), sub-acute appendicitis (2) and previously decompressing anovestibular fistula with intestinal obstruction (1).

Twenty (40%) centres suspended their elective surgeries less than 2 weeks prior to the survey in April, 26(52%) centres stopped a month earlier and 4(8%) had suspended their elective list for over a month.

Adopted protocols for urgent cases by the centres was to immediately operate in 31(62%), delayed intervention in 12(24%), masterly inactivity in 2(4%) and follow up in 5(10%) as shown in Figure 2.

Impact on Surgeons

Paediatric surgeons perception of safety to operate during the pandemic rated low in 37(50%), indifferent in 18(24.3%) and high in 19(25.7%) respondents. The number of surgeons with high perception of safety to operate (25.7%) was higher than those highly willing to operate on COVID-19 positive patients (20.3%) as shown in Figure 3. No member of the surgical team had tested positive for COVID-19.

Fifty-seven (77%) agreed to a need for paediatric surgeons to have additional training in management of surgical patients during epidemics, 6(8.1%) were neutral, while 11(14.9%) disagreed. Those willing to attend such training were 47(63.5%), 15(20.3%) were neutral and 12(16.2%) were unwilling (P= 0.004).

There was no statistically significant difference when their perception of safety to operate was correlated with willingness to operate generally, same with perception of adequacy of PPE and their perception of how good their institution is coping with the COVID-19 pandemic. The number of years in practice also showed no statistically significant correlation with the perception of safety to operate during the pandemic (Table 3).

Changes in Management Modality

Nine (18%) centres have newly adopted non-operative modalities for managing selected surgical conditions in response to the pandemic. One (2%) centre adopted non-operative reduction of intussusception while 5(10%) centres adopted management of uncomplicated acute appendicitis with antibiotics and 3(6%) took a more conservative approach to management of trauma. Three (6%) centres replaced laparoscopic appendectomy with open surgery.

Table 3: Correlation of various perception responses

Perceptions	Answers	Yes	Indifferent	No	Total	Std error	P value
Safety vs Willingness to operate	High	1	4	7	12	0.141	0.876
	Indifferent	2	2	9	13		
	Low	5	3	17	25		
	Total	8	9	33	50		
Training need vs willingness to attend	High	27	7	5	39	0.127	0.004
	Indifferent	1	3	1	5		
	Low	1	3	2	6		
	Total	29	13	8	50		
Adequacy of PPE vs institution Coping	High	2	0	4	6	0.145	0.044
	Indifferent	1	6	6	13		
	Low	1	5	25	31		
	Total	4	11	35	50		
No of years in practice vs safety to operate	1-10	6	9	19	34	0.147	0.276
	11-20	6	4	3	13		
	>20years	0	0	3	3		
	Total	12	13	25	50		

Impact on Institutions, Supplies and Outpatient Clinics

Forty-two (84%) centres had designated isolation wards but only 2(4%) had COVID-19 positive children on admission and none had managed COVID-19 positive children with surgical condition in their facility at the time of this survey. There was low perception of adequacy of PPE for theatre staff both at the time of survey in 35(70%) centres and at 3 months afterwards in 40(80%) centres as depicted in Figure 4. Forty (80%) centres do not offer hospital

powered telemedicine services for patients follow up despite lockdown on outpatient clinics. The pie chart in Figure 5 shows a low rating of how institutions are coping with the pandemic.

Impact on Academic Training Programs

Twenty-nine (58%) centres had suspended academic training during the pandemic, 13(26%) engaged "WhatsApp" chat rooms, while 3(6%) made use of Video-conferencing and 5(10%) still carried out their academic training through physical meetings but with social distancing (Figure 6).

DISCUSSION

Pandemics usually run ravaging course with unpredictable but significant health, social, economic and political disruptions (4). The impact is multifaceted, can be difficult to assess and is an area of active research. While the direct health impact of pandemics can be catastrophic, the indirect health impact driven by depletion of resources and reduced assess to routine care can lead to further increase in morbidity and mortality (4).

The COVID-19 pandemic is rapidly evolving with unprecedented impact on global health systems. China, and later the United States, Italy and other European countries became hotspots for the virus after reporting their first cases in December 2019 and January 2020 respectively (2,5,6). Travellers from these regions brought in the disease to Africa, including Nigeria in February 2020 (7,8) with a rapid expansion in the number of cases in sub-Saharan Africa (9). The World Health Organization formally declared COVID-19 outbreak a pandemic on 11th March with 634 813 total confirmed cases as at 29th March, 2020 (10,11). This has sparked various adaptations in healthcare responses and management, with unpredictable outcomes heightened by depletion of resources. For example, the only paediatric surgery care facility in

Liberia run by Médecins Sans Frontières (MSF) has been temporarily suspended due to travel restrictions (12).

Children are known to be more susceptible to viral respiratory diseases but ironically, statistics on COVID-19 have shown low incidence in this age group. An analysis of 72 314 cases of COVID-19 from the Chinese Centre for Disease Control and Prevention showed a low incidence in children with those younger than 10 years accounting for only 1% of cases (13). Haiyan Qiu and colleagues in an observational cohort study of 36 children with COVID-19 in *The Lancet Infectious Diseases* found that all the patients had mild (47%) or moderate (53%) type of COVID-19 with large proportion (28%) being asymptomatic (14). This clinical pattern of COVID-19 in the paediatric population could make children important facilitators of viral transmission, and may thus place providers of health care in them at increased risk of infection (14–16).

Our survey showed that majority of the paediatric surgeons have stopped operating on all elective conditions in both public and private tertiary health institutions to minimise contact with potential carriers of the virus and conserve resources. This is consistent with the American College of Surgeons COVID 19: Elective Case Triage Guidelines for Surgical Care which recommended that surgery should be performed only if delaying the procedure is likely to prolong hospital stay, increase the likelihood of later hospital admission or cause harm to the patient (17). A recent article recognises the higher frequency of highly symptomatic patients on the elective operation list in LMICs compared to HICs but still advocates that truly elective operations should be postponed to preserve PPE, staff and facility capacity as important resources during a surge response (18).

The ACS advocates that “children who have failed attempts at medical management of a surgical condition should be considered for surgery” (17). Our study revealed an increased

uptake of non-operative management of some surgical conditions such as intussusception, uncomplicated appendicitis and some cases of trauma by 2%, 10% and 6% respectively. This modality of care was probably adopted to reduce exposure to surgery during the pandemic as 9(18%) centres have newly adopted this approach. Outcome of these modifications in management protocol may be subject to future research.

Some suspended elective cases had presented as emergencies as reported in 11(22%) centres. They included incarcerated inguinoscrotal hernias (10), sub-acute appendicitis (2) and previously decompressing anovestibular fistula that developed partial obstruction (1). This is an indirect impact of the pandemic due to reduced assess to routine care in these patients. Official tele-medicine platforms for follow up care of patients may aid early detection of complications or other needs for hospital visits while elective surgeries remain suspended, outpatient clinics locked down and patients are being given long appointments. Only 10(20%) centers in our survey have an official tele-medicine platform for follow up care of patients especially during this period of covid-19 pandemic. The ACS recommends that tele-medicine and tele-consult services should be used for patient and physician interaction when available (19).

In this report, all centres continued to operate on emergencies and there was consistent monthly average number of surgeries from November 2019 to February 2020 but a sharp decline in March 2020. This corresponded with the period of social and economic disruptions which followed the first confirmed case of COVID-19 in Nigeria reported on 27th February 2020 (8,20).

Majority of centres (84%) had designated isolation wards, but only 4% of them had children with the virus and none had managed a COVID-19 positive child with surgical condition. Although local statistics of incidence in children was not available in our literature search, our

finding is suggestive of a low incidence of confirmed COVID-19 in children in Nigeria which is consistent with global data (13,21). Despite this low incidence in children, about half of paediatric surgeons in our survey feel unsafe operating on patients during this period and more are unwilling to operate on confirmed COVID-19 patients. Willingness to operate on patients during this period negatively correlated with advanced years of experience, availability of adequate PPE, good rating of institutions' infrastructural adequacy for coping with the pandemic and training on COVID-19 preparedness and care. A systematic review and meta-analyses of healthcare workers' willingness to work during an influenza pandemic showed statistically significant association between increased willingness to work and perceived personal safety, awareness of pandemic risk and clinical knowledge of influenza pandemics, role-specific knowledge, pandemic response training, and confidence in personal skills (22). The reason for this disparity with our study may be partly due to increased susceptibility of older persons to COVID-19 but further research may clarify this finding.

Majority of centres (58%) had suspended academic training during this pandemic while 26% engaged "WhatsApp" chat rooms. Only 6% made use of Video-conferencing. Poor internet connectivity and high cost of subscription in sub-Sahara Africa may be partly responsible for this poor uptake of video communication (23,24). Online chat rooms are generally accessible and may be explored as viable media alternative.

This research is survey based with attendant limitation of recall. The study however does provide information on early impact of COVID-19 pandemic on paediatric surgery in Nigeria to help in beginning to plan towards restarting services and handling future unprecedented situations.

CONCLUSION

The COVID-19 pandemic has resulted in cessation of elective surgeries and a sharp decline in the number of emergency surgeries performed on children in Nigeria. Significant number of pediatric surgeons do not feel safe operating on patients and are mostly unwilling to operate on COVID-19 positive patients in the initial stages of the pandemic. Measures to improve their safety and electronic communication with patients and professional colleagues during the pandemic may help improve the surgical care of children. A follow up study is planned to identify further impacts of the pandemic on children's surgical care.

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FIGURES

Figure 1: Cluster bar chart of the mean number of surgeries over 5 months

Figure 2: Protocols adopted by centres for urgent cases

Figure 3: Perception of safety of paediatric surgeons and willingness to operate

Figure 4: Perception of adequacy of PPE for theatre staff now and in 3 months

Figure 5: Ratings of how institutions are coping with COVID-19 pandemic

Figure 6: Impact of COVID-19 on academic training

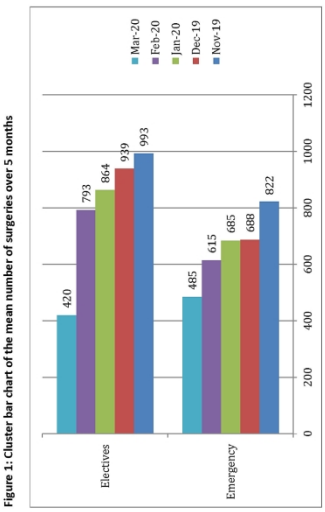

Figure 1: Cluster bar chart of the mean number of surgeries over 5 months

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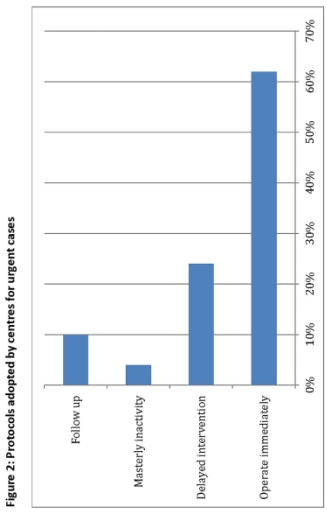

Figure 2: Protocols adopted by centres for urgent cases

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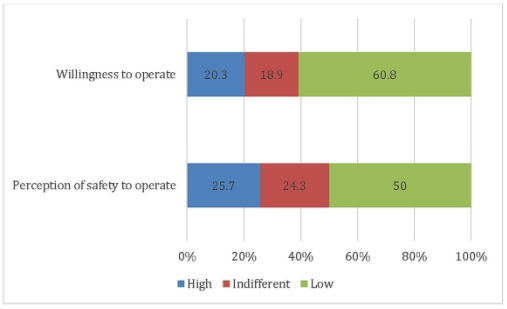
Figure 3: Perception of safety of paediatric surgeons and willingness to operate



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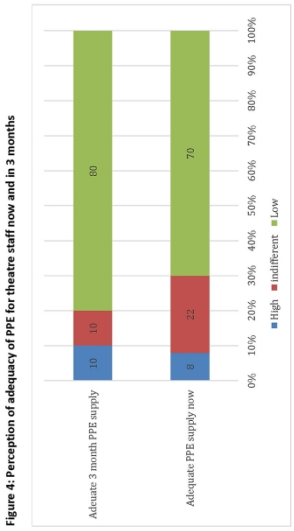

Figure 4: Perception of adequacy of PPE for theatre staff now and in 3 months

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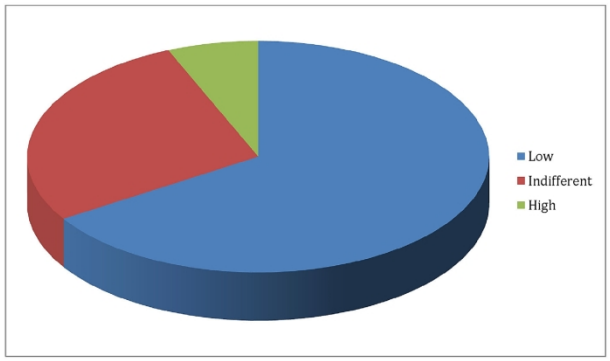
Figure 5: Ratings of how institutions are coping with COVID-19 pandemic



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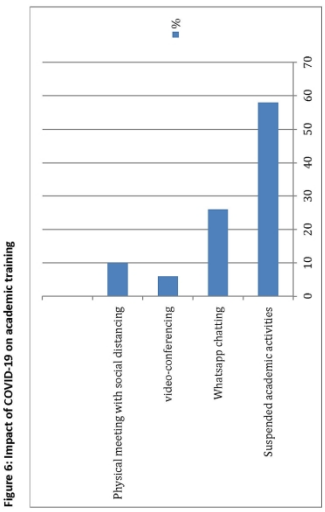

Figure 6: Impact of COVID-19 on academic training

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Keywords:	Health services research

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TITLE PAGE

Title:

Early Impact of COVID-19 Pandemic on Paediatric Surgical Practice in Nigeria: a National Survey of Paediatric Surgeons.

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Ethics Approval: Health Research Ethics Committee of Olabisi Onabanjo University Teaching Hospital, Sagamu, Ogun State, Nigeria. OOUTH/HREC/339/2020AP.

Word Count: 1 967.

ABSTRACT

Introduction The novel Coronavirus disease has had significant impact on healthcare globally. Knowledge of this virus is evolving, definitive care is not yet known, and mortality is increasing. We assessed its initial impact on paediatric surgical practice in Nigeria, creating a benchmark for recommendations and future reference.

Methods Survey of 120 paediatric surgeons from 50 centres to assess socio-demographics and specific domains of impact of COVID-19 on their services and training in Nigeria. Seventy four surgeons adequately responded. Responses have been analysed. Duplicate submissions for centres were excluded by combining and averaging the responses from centres with multiple respondents.

Results Forty-six (92%) centres had suspended elective surgeries. All centres continued emergency surgeries but volume reduced in March by 31%. Eleven (22%) centres reported 13 suspended elective cases presenting as emergencies in March, accounting for 3% of total emergency surgeries. Nine (18%) centres adopted new modalities for managing selected surgical conditions: non-operative reduction of intussusception in 1(2%), antibiotic management of uncomplicated acute appendicitis in 5(10%), more conservative management of trauma and replacement of laparoscopic appendectomy with open surgery in 3(6%) respectively. Low perception of adequacy of Personal Protective Equipment (PPE) was reported in 35(70%) centres. Forty (80%) centres did not offer telemedicine for patients follow up. Twenty-nine (58%) centres had suspended academic training. Perception of safety to operate was low in 37(50%) respondents, indifferent in 24% and high in 26%.

Conclusion Majority of paediatric surgical centres reported cessation of elective surgeries whilst continuing emergencies. There is however an acute decline in the volume of emergency surgeries. Adequate PPE need to be provided and preparations towards handling backlog of

elective surgeries once the pandemic recedes. Further study is planned to more conclusively understand the full impact of this pandemic on children's surgery.

Key words: pandemic, COVID-19, children's surgery.

What is already known and what this study adds

Anecdotal evidence suggests that elective surgeries in children have been suspended due to COVID-19 pandemic.

Our study shows that most centres have suspended elective surgeries. All centres continued emergency surgeries but the volume reduced by 31% in March 2020. Moreover, 3% of the emergency surgeries were some of the suspended elective cases presenting as emergencies. Almost 20% of centres have newly adopted non-operative modalities for managing selected emergency surgical conditions.

This data shows an urgent need for consensus guidelines for emergency services and protocols for handling backlog of elective surgeries in children once the pandemic recedes. Outcome of the modifications in treatment may be subject to future research.

BACKGROUND

Corona virus disease 19 (COVID-19) is a highly transmissible novel viral illness, caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (1). It was reported to have emerged in Wuhan, China, in December 2019 but later spread to other parts of China and other countries of the world (2). This disease poses a huge challenge to health care systems around the world. The U.S. Department of Health and Human Services stated in its 2017 Pandemic Influenza plan update that "emerging viral pandemics can place extraordinary and sustained demands on public health and health systems and on providers of essential community services" (3). The effect may be more profound in regions with already limited resources and fragile health infrastructure. The aim of this study was to carry out a survey of paediatric surgeons in a resource limited setting to assess early effects of the COVID-19 pandemic on their practice in the initial stages of the outbreak. Data obtained would be used for recommendations and future reference.

METHODS

Relevant information was obtained from paediatric surgeons (consultants and senior registrars) currently practising in Nigeria, using a pre-tested questionnaire designed on Microsoft Word version 10 (Microsoft Seattle, WA, USA) and transcribed to google form. The questions were based on 5-point Likert scale (Strongly agree, agree, neither agree nor disagree, disagree, strongly disagree). We circulated the forms to the predetermined group of specialists by email and online chat rooms and kept them open from 10th to 17th April 2020. Daily reminders were also sent.

Participants were required to provide socio-demographic data, information on patient traffic and decision on management of specific conditions, availability of PPE, impact on surgeon's psyche, their academic programs and institutions infrastructure.

A total of 120 paediatric surgeons were sent the survey. Eighty-three paediatric surgeons responded but 74 were adequately completed. For the purpose of analysis, the 5-point Likert scale was reduced to 3 points (Agree, neutral, disagree).

Duplicate submissions for centres were excluded by combining and averaging the responses from centres with multiple responses.

Responses were analysed using SPSS version 22 and presented as categorical data and percentages.

Patient and Public Involvement statement: This research was done without patient involvement. Patients were not invited to comment on the study design and were not consulted to develop patient relevant outcomes or interpret the results. Patients were not invited to contribute to the writing or editing of this document for readability or accuracy.

Ethics Approval: Obtained from the Health Research Ethics Committee of Olabisi Onabanjo University Teaching Hospital, Sagamu, Ogun State, Nigeria (OOUTH/HREC/339/2020AP).

RESULTS

Demographics

The response rate was 74(61%). The 74 completed responses represented 50 centres across the country. Table 1 shows the socio-demographic characteristics of respondents.

Table: 1 Socio-demographic characteristics of respondents

Characteristics of respondents	Scores	Percentage
1.Cadre	N=74	
Consultant	45	61
Senior-Registrar	29	39
2.Gender	N=74	
Male	62	84
Female	12	16
3.Work place	N=50	
Public	48	96
Private	2	4
4.Type of Health facility	N=50	
Teaching hospital	39	78
Federal Medical Centre	10	20
General/Specialist Hospital	1	2

Impact on Surgeries

Elective surgeries had been suspended in 46(92%) centres at the time of this survey. There was a steady decline in the average number of elective surgeries done over 5 months between November 2019 with 993(25% of 5 month total) and March 2020 with 420(10% of total) cases. Similar trend was observed with emergency surgeries which reduced from 822(25% of 5 month total) in November 2019 to 485(15% of total) in March 2020. Comparatively, there were more elective than emergency surgeries per month until March (Figure 1).

Twenty (40%) centres suspended their elective surgeries less than 2 weeks prior to the survey in April, 26(52%) centres stopped a month earlier and 4(8%) had suspended their elective list for over a month.

Adverse clinical outcomes

Eleven (22%) centres reported at least one of the elective cases suspended due to COVID-19 pandemic presenting as emergency in March. There were 13 of such patients accounting for an estimated 3% of the total emergency surgeries for the month. They included inguinoscrotal hernias (10) with obstruction, sub-acute appendicitis (2) and previously decompressing anovestibular fistula with intestinal obstruction (1).

Changes in Management Modality

Nine (18%) centres have newly adopted non-operative modalities for managing selected surgical conditions in response to the pandemic. One (2%) centre adopted non-operative reduction of intussusception while 5(10%) centres adopted management of uncomplicated acute appendicitis with antibiotics and 3(6%) took a more conservative approach to management of trauma. Three (6%) centres replaced laparoscopic appendectomy with open surgery.

Protocol for the management of urgent cases such as cancers, symptomatic hernias in the early period of COVID-19 was to continue to immediately operate in 31(62%) centres, delayed intervention in 12(24%), masterly inactivity in 2(4%) and follow up in 5(10%).

Impact on Surgeons

Paediatric surgeons' perception of safety to operate during the pandemic and their willingness to operate on COVID-19 positive patients are shown in figure 2. Perception of safety to operate

rated low in half of respondents. No member of the surgical teams had tested positive for COVID-19.

Fifty-seven (77%) agreed to a need for paediatric surgeons to have additional training in management of surgical patients during epidemics, 6(8%) were neutral, while 11(15%) disagreed. Those willing to attend such training were 47(64%), 15(20%) were neutral and 12(16%) were unwilling.

Impact on Institutions, Supplies and Outpatient Clinics

Forty-two (84%) centres had designated isolation wards but only 2(4%) had COVID-19 positive children on admission and none had managed COVID-19 positive children with surgical condition in their facility at the time of this survey. Majority of centres had low perception of adequacy of PPE for theatre staff both at the time of survey and at 3 months afterwards as depicted in Figure 3. Ratings of how institutions are coping with the COVID-19 pandemic was low in 33(66%), intermediate in 14(28%) and high in 3(6%) centres. Forty (80%) centres do not offer hospital powered telemedicine services for patients follow up despite lockdown on outpatient clinics.

Impact on Academic Training Programs

Twenty-nine (58%) centres had suspended academic training during the pandemic, 13(26%) engaged “WhatsApp” chat rooms, while 3(6%) made use of Video-conferencing and 5(10%) still carried out their academic training through physical meetings but with social distancing.

DISCUSSION

Pandemics usually run ravaging course with unpredictable health, social and economic disruptions (4). The impact can be difficult to assess and is an area of active research. While

the direct health impact of pandemics can be catastrophic, the indirect impact driven by depletion of resources and reduced assess to routine care can lead to further increase in morbidity and mortality (4).

COVID-19 pandemic is rapidly evolving with unprecedented impact on global health systems. China, and later the United States, Italy and other European countries became hotspots for the virus after reporting their first cases in December 2019 and January 2020 respectively (2,5,6). Travellers from these regions brought in the disease to Africa, including Nigeria in February 2020 (7,8) with a rapid expansion in the number of cases in sub-Saharan Africa (9). The World Health Organization formally declared COVID-19 outbreak a pandemic on 11th March with 634 813 total confirmed cases as at 29th March, 2020 (10,11). This has sparked various adaptations in healthcare responses and management, with unpredictable outcomes heightened by depletion of resources. For example, the only paediatric surgery care facility in Liberia run by Médecins Sans Frontières (MSF) has been temporarily suspended due to travel restrictions (12).

Children are more susceptible to viral respiratory diseases but ironically, statistics on COVID-19 have shown low incidence in this age group. An analysis of 72 314 cases of COVID-19 from the Chinese Centre for Disease Control and Prevention showed a low incidence in children with those younger than 10 years accounting for only 1% of cases (13). A recent observational cohort study of 36 children with COVID-19 found that all the patients had mild (47%) or moderate (53%) type of COVID-19 with large proportion (28%) being asymptomatic (14). This clinical pattern of COVID-19 in the paediatric population could make children important facilitators of viral transmission, and may thus place providers of health care in them at increased risk of infection (14–16).

Our survey showed that majority of the paediatric surgeons have stopped operating on all elective conditions in both public and private tertiary health institutions to minimise contact with potential carriers of the virus and conserve resources. This is consistent with the American College of Surgeons COVID 19: Elective Case Triage Guidelines for Surgical Care which recommended that surgery should be performed only if delaying the procedure is likely to prolong hospital stay, increase the likelihood of later hospital admission or cause harm to the patient (17). A recent article recognises the higher frequency of highly symptomatic patients on the elective operation list in LMICs compared to HICs but still advocates that truly elective operations should be postponed to preserve PPE, staff and facility capacity as important resources during a surge response (18).

The ACS advocates that "children who have failed attempts at medical management of a surgical condition should be considered for surgery" (17). Our study revealed an increased uptake of non-operative management of some surgical conditions such as intussusception, uncomplicated appendicitis and some cases of trauma. This modality of care was probably adopted to reduce exposure to surgery during the pandemic. Outcome of these modifications in management protocol may be subject to future research.

Some suspended elective cases had presented as emergencies. They included incarcerated inguinoscrotal hernias, sub-acute appendicitis and previously decompressing anovestibular fistula that developed partial obstruction. This is an indirect impact of the pandemic due to reduced assess to routine care in these patients. Official tele-medicine platforms for follow up care of patients may aid early detection of complications or other needs for hospital visits while elective surgeries remain suspended, outpatient clinics locked down and patients are being given long appointments. Few centers in our survey have an official tele-medicine platform for follow up care of patients especially during this period of covid-19 pandemic. The ACS

recommends that tele-medicine and tele-consult services should be used for patient and physician interaction when available (19).

In this report, all centres continued to operate on emergencies and there was consistent monthly average number of surgeries from November 2019 to February 2020 but a sharp decline in March 2020. This corresponded with the period of social and economic disruptions which followed the first confirmed case of COVID-19 in Nigeria reported on 27th February 2020 (8,20).

Majority of centres had designated isolation wards, but only 4% of them had children with the virus and none had managed a COVID-19 positive child with surgical condition. Although local statistics of incidence in children was not available in our literature search, our finding is suggestive of a low incidence of confirmed COVID-19 in children in Nigeria which is consistent with global data (13,21). Despite this low incidence in children, about half of paediatric surgeons in our survey feel unsafe operating on patients during this period and more are unwilling to operate on confirmed COVID-19 patients.

Majority of centres had suspended academic training during this pandemic. Very few made use of Video-conferencing. Poor internet connectivity and high cost of subscription in sub-Sahara Africa may be partly responsible for this poor uptake of video communication (22,23). Online chat rooms are generally accessible and may be explored as viable media alternative.

This research is survey based with attendant limitation of recall. The study however does provide information on early impact of COVID-19 pandemic on paediatric surgery in Nigeria to help in beginning to plan towards restarting services and handling future unprecedented situations.

CONCLUSION

The COVID-19 pandemic has resulted in cessation of elective surgeries and a sharp decline in the number of emergency surgeries performed on children in Nigeria. Significant number of pediatric surgeons do not feel safe operating on patients and are mostly unwilling to operate on COVID-19 positive patients in the initial stages of the pandemic. Measures to improve their safety and electronic communication with patients and professional colleagues during the pandemic may help improve the surgical care of children. A follow up study is planned to identify further impacts of the pandemic on children's surgical care.

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FIGURES

Figure 1: Cluster bar chart of the mean number of surgeries over 5 months

Figure 2: Perception of safety of paediatric surgeons and willingness to operate

Figure 3: Perception of adequacy of PPE for theatre staff now and in 3 months

Figure 1: Cluster column chart of the mean number of surgeries over 5 months

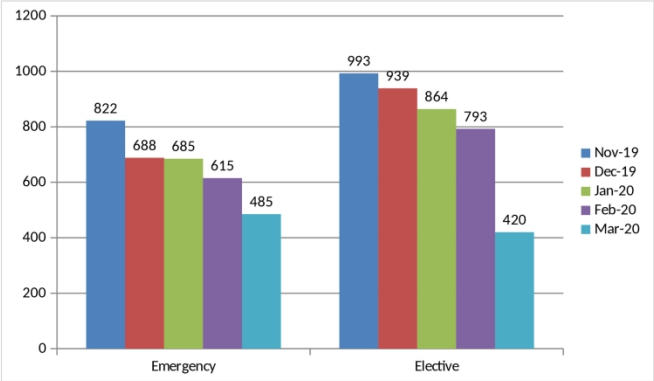

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Figure 2: Perception of safety of paediatric surgeons and willingness to operate

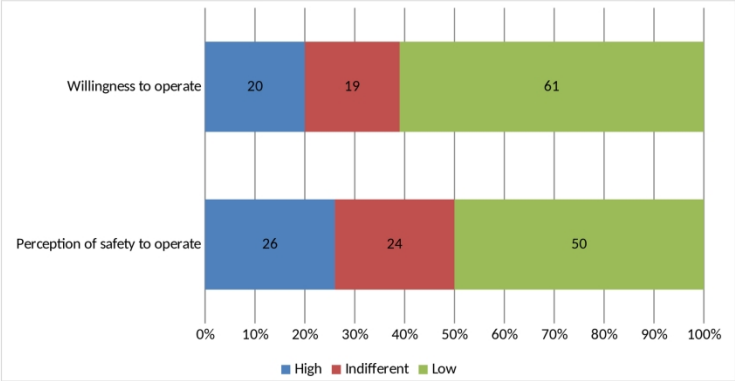

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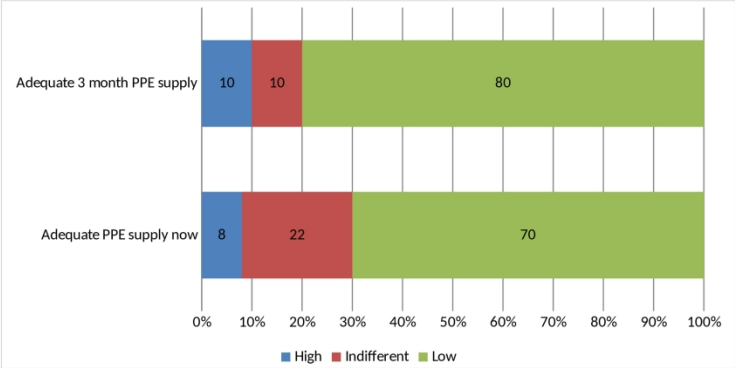
Figure 3: Perception of adequacy of PPE for theatre staff now and in 3 months



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Questionnaire

Title: Early Impact of Covid-19 Pandemic on Paediatric Surgical Practise in Nigeria: a National Survey of Paediatric Surgeons.

Dear colleague, we are conducting a national survey to assess the "Early Impact of Covid-19 Pandemic on Paediatric Surgical Practise in Nigeria."

Kindly spare some time to complete this questionnaire. Some of the questions are centre based. All information provided shall be treated with strict confidentiality.

Complete and submit this form only if you consent to information provided being used for the purposes of research.

Thank you.

SECTION A. SOCIO-DEMOGRAPHIC DETAILS

1. Gender: Male ( ) Female ( )

2. Age at last birthday (years): …….

3. Cadre: Consultant ( ) Senior Registrar ( )

4. Years of practice of paediatric surgery specialty: ……..

5. Location of practice (e.g. Lagos state): ……..

6. Current place of work: ……

7. Type of current place of work: Public Hospital ( ) Private Hospital ( )

8. Category of Health Facility:

Teaching Hospital ( ) Federal Medical Centre ( ) General/specialist Hospital ( )

SECTION B. IMPACT ON SURGERIES

1. What is the average number of elective surgeries performed in your centre during the following months?

November 2019	1-10 ( )	11-20 ( )	21-30 ( )	> 30 ( )
December 2019	1-10 ( )	11-20 ( )	21-30 ( )	> 30 ( )
January 2020	1-10 ( )	11-20 ( )	21-30 ( )	> 30 ( )
February 2020	1-10 ( )	11-20 ( )	21-30 ( )	> 30 ( )
March 2020	1-10 ( )	11-20 ( )	21-30 ( )	> 30 ( )

2. Do you still take elective surgeries in your hospital? Yes ( ) No ( )

If No, how long have you stopped? <1 week ( ) 1-2 weeks ( ) 3-4 weeks ( ) >4weeks ( )

3. If you have suspended elective surgeries due to COVID-19, have you had any of such cases present as emergency? Yes ( ) No ( )

If yes, kindly list the number of such cases in your centre, the diagnosis and the age of patient(s):

……
……
……

4. What is the average number of emergency surgeries performed in your centre during the following months?

November 2019	1-10 ( )	11-20 ( )	21-30 ( )	> 30 ( )
December 2019	1-10 ( )	11-20 ( )	21-30 ( )	> 30 ( )
January 2020	1-10 ( )	11-20 ( )	21-30 ( )	> 30 ( )
February 2020	1-10 ( )	11-20 ( )	21-30 ( )	> 30 ( )
March 2020	1-10 ( )	11-20 ( )	21-30 ( )	> 30 ( )

5. State your unit protocol for the management of urgent cases such as cancers, symptomatic hernias in this period of COVID-19:

☐Operate immediately

☐Delayed intervention

☐See as follow up

☐Masterly inactivity

Please answer some of the following questions using a Likert scale of 1-5

(1- Strongly agree, 2- agree, 3- indifferent, 4- disagree and 5- strongly disagree)

SECTION C. IMPACT ON SURGEONS

1. I feel safe operating on patients during the COVID-19 pandemic:

1( ) 2( ) 3( ) 4( ) 5( )

2. I am willing to operate on a confirmed COVID-19 positive patients

1( ) 2( ) 3( ) 4( ) 5( )

3. Has any member of your surgical team tested positive to COVID-19?

Yes ( ) No ( ). If yes, how many? ……..

4. Have you had any formal training on COVID-19 care and preparedness?

Yes ( ) No ( )

5. Paediatric surgeons need to have additional training in management of surgical patients during epidemics 1( ) 2( ) 3( ) 4( ) 5( )

6. I am willing to attend such training as in 5 above

1( ) 2( ) 3( ) 4( ) 5( )

SECTION D. CHANGES IN MANAGEMENT MODALITY

How has Covid-19 influenced your modality of management of following conditions?

1. Acute appendicitis

☐A change to conservative management with antibiotics

☐Operative (Open) as usual

☐Operative (Laparoscopy) as usual

☐Operative (Laparoscopy with HME filter and CO2 filter)

☐Change from Laparoscopic to open surgery

2. Uncomplicated intussusception

☐Non operative reduction as usual

☐Operative reduction as usual

☐Change from operative to non-operative reduction

☐Change from non-operative to operative reduction

3. Trauma

☐No change in management modality

☐Attempt to be more conservative in management

Please answer some of the following questions using a Likert scale of 1-5

(1- Strongly agree, 2- agree, 3- indifferent, 4- disagree and 5- strongly disagree)

SECTION E. IMPACT ON INSTITUTIONS, SUPPLIES AND OUT-PATIENT CLINICS

1. Do you have designated isolation wards for COVID-19 patients in your hospital?

Yes ( ) No ( )

2. Do you have children with COVID-19 being managed in your hospital?

Yes ( ) No ( )

3. Have you managed COVID-19 positive children with surgical condition in your centre? Yes ( ) No ( )

   If Yes, how many of such patients? …….

4. Do you still run out-patient clinics in your hospital?

   Yes ( ) No ( )

5. Do you have an official telemedicine platform for patient follow up in your hospital?
   Yes ( ) No ( )

6. We have adequate supply of PPE for every surgery now:

   1( ) 2( ) 3( ) 4( ) 5( )

7. We have adequate supply of PPE for every surgery for the next 3 months:

   1( ) 2( ) 3( ) 4( ) 5( )

8. My hospital is coping well with the COVID-19 pandemic:

   1( ) 2( ) 3( ) 4( ) 5( )

SECTION F. IMPACT ON ACADEMIC TRAINING

1. How are you carrying out academic programs in your hospital during this COVID-19 pandemic?

☐WhatsApp chatting

☐Video conferencing

☐Physical meetings with social distancing

☐No academic activity at the moment

Thank you for your time.

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Keywords:	Health services research

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TITLE PAGE

Title:

Early Impact of COVID-19 Pandemic on Paediatric Surgical Practice in Nigeria: a National Survey of Paediatric Surgeons.

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Ethics Approval: Health Research Ethics Committee of Olabisi Onabanjo University Teaching Hospital, Sagamu, Ogun State, Nigeria. OOUTH/HREC/339/2020AP.

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ABSTRACT

Introduction The novel Coronavirus disease has had significant impact on healthcare globally. Knowledge of this virus is evolving, definitive care is not yet known, and mortality is increasing. We assessed its initial impact on paediatric surgical practice in Nigeria, creating a benchmark for recommendations and future reference.

Methods Survey of 120 paediatric surgeons from 50 centres to assess socio-demographics and specific domains of impact of COVID-19 on their services and training in Nigeria. Seventy four surgeons from the 50 centres adequately responded. Valid responses were represented as categorical data and presented in percentages. Duplicate submissions for centres were excluded by combining and taking the average of responses from centres with multiple respondents.

Results Response rate was 74(61%). Forty-six (92%) centres had suspended elective surgeries. All centres continued emergency surgeries but volume reduced in March by 31%. Eleven (22%) centres reported 13 suspended elective cases presenting as emergencies in March, accounting for 3% of total emergency surgeries. Twelve (24%) centres adopted new modalities for managing selected surgical conditions: non-operative reduction of intussusception in 1(2%), antibiotic management of uncomplicated acute appendicitis in 5(10%), more conservative management of trauma and replacement of laparoscopic appendectomy with open surgery in 3(6%) respectively. Low perception of adequacy of Personal Protective Equipment (PPE) was reported in 35(70%) centres. Forty (80%) centres did not offer telemedicine for patients follow up. Twenty-nine (58%) centres had suspended academic training. Perception of safety to operate was low in 37(50%) respondents, indifferent in 24% and high in 26%.

Conclusion Majority of paediatric surgical centres reported cessation of elective surgeries whilst continuing emergencies. There was however an acute decline in the volume of emergency surgeries. Adequate PPE need to be provided and preparations towards handling

backlog of elective surgeries once the pandemic recedes. Further study is planned to more conclusively understand the full impact of this pandemic on children's surgery.

Key words: pandemic, COVID-19, children's surgery.

What is already known

Anecdotal evidence suggests that elective surgeries in children have been suspended due to COVID-19 pandemic.

What this study adds

Our study shows that:

1. Most centres (92%) had suspended elective surgeries.
2. Emergency surgeries were also impacted with reduction from pre-COVID volumes by one-third in March 2020.
3. Some suspended elective cases developed emergent problems and presented as emergencies.
4. One-fifth of centres for the first time adopted non-operative modalities of treatment for selected emergent conditions.

BACKGROUND

Corona virus disease 19 (COVID-19) is a highly transmissible novel viral illness, caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (1). It was reported to have emerged in Wuhan, China, in December 2019 but later spread to other parts of China and other countries of the world (2). This disease poses a huge challenge to health care systems around the world. The U.S. Department of Health and Human Services stated in its 2017 Pandemic Influenza plan update that "emerging viral pandemics can place extraordinary and sustained demands on public health and health systems and on providers of essential community services" (3). The effect may be more profound in regions with already limited resources and fragile health infrastructure. The aim of this study was to carry out a survey of paediatric surgeons in a resource limited setting to assess early effects of the COVID-19 pandemic on their practice in the initial stages of the outbreak. Data obtained would be used for recommendations and future reference.

METHODS

Relevant information was obtained from paediatric surgeons (consultants and senior registrars) currently practising in Nigeria, using a pre-tested questionnaire (Appendix 1) designed on Microsoft Word version 10 (Microsoft Seattle, WA, USA) and transcribed to google form. The questions were based on 5-point Likert scale (Strongly agree, agree, neither agree nor disagree, disagree, strongly disagree). We circulated the forms to the predetermined group of specialists by email and online chat rooms and kept them open from 10th to 17th April 2020. Daily reminders were also sent.

Participants were required to provide socio-demographic data, information on patient traffic and decision on management of specific conditions, availability of PPE, impact on surgeon's psyche, their academic programs and institutions infrastructure.

A total of 120 paediatric surgeons were sent the survey. Eighty-three paediatric surgeons responded but 74 were adequately completed. For the purpose of analysis, the 5-point Likert scale was reduced to 3 points. Strongly agree and agree were merged as agree, neither agree nor disagree was retained as neutral, disagree and strongly disagree were merged as disagree.

Duplicate submissions for centres were excluded by combining and taking the average of responses from centres with multiple responses.

Responses were analysed using SPSS version 22 and presented as categorical data and percentages.

Patient and Public Involvement statement: This research was done without patient involvement. Patients were not invited to comment on the study design and were not consulted to develop patient relevant outcomes or interpret the results. Patients were not invited to contribute to the writing or editing of this document for readability or accuracy.

Ethics Approval: Obtained from the Health Research Ethics Committee of Olabisi Onabanjo University Teaching Hospital, Sagamu, Ogun State, Nigeria (OOUTH/HREC/339/2020AP).

RESULTS

Demographics

The response rate was 74(61%). The 74 completed responses represented 50 centres across the country. Table 1 shows the socio-demographic characteristics of respondents.

Table: 1 Socio-demographic characteristics of respondents

Characteristics of respondents	Scores	Percentage
1.Cadre	N=74	
Consultant	45	61
Senior-Registrar	29	39
2.Gender	N=74	
Male	62	84
Female	12	16
3.Work place	N=50	
Public	48	96
Private	2	4
4.Type of Health facility	N=50	
Teaching hospital	39	78
Federal Medical Centre	10	20
General/Specialist Hospital	1	2

Impact on Surgeries

Elective surgeries had been suspended in 46(92%) centres at the time of this survey. There was a steady decline in the average number of elective surgeries done over 5 months between November 2019 with 993(25% of 5 month total) and March 2020 with 420(10% of total) cases. Similar trend was observed with emergency surgeries which reduced from 822(25% of 5 month total) in November 2019 to 485(15% of total) in March 2020. Comparatively, there were more elective than emergency surgeries per month until March (Figure 1).

Twenty (40%) centres suspended their elective surgeries less than 2 weeks prior to the survey in April, 26(52%) centres stopped a month earlier and 4(8%) had suspended their elective list for over a month. However, the actual numbers of operations cancelled could not be ascertained in the present study.

Adverse clinical outcomes

Eleven (22%) centres reported at least one of the elective cases suspended due to COVID-19 pandemic presenting as emergency in March. There were 13 of such patients accounting for an estimated 3% of the total emergency surgeries for the month. They included inguinoscrotal hernias (10) with obstruction, sub-acute appendicitis (2) and previously decompressing anovestibular fistula with intestinal obstruction (1).

Changes in Management Modality

Nine (18%) centres have newly adopted non-operative modalities for managing selected surgical conditions in response to the pandemic. One (2%) centre adopted non-operative reduction of intussusception while 5(10%) centres adopted management of uncomplicated acute appendicitis with antibiotics and 3(6%) took a more conservative approach to management of trauma. Three (6%) centres replaced laparoscopic appendectomy with open surgery.

Protocol for the management of urgent cases such as cancers, symptomatic hernias in the early period of COVID-19 was to continue to immediately operate in 31(62%) centres, delayed intervention in 12(24%), masterly inactivity in 2(4%) and follow up in 5(10%).

Impact on Surgeons

Paediatric surgeons' perception of safety to operate during the pandemic and their willingness to operate on COVID-19 positive patients are shown in figure 2. Perception of safety to operate

rated low in half of respondents. No member of the surgical teams had tested positive for COVID-19 at the time of the survey.

Fifty-seven (77%) agreed to a need for paediatric surgeons to have additional training in management of surgical patients during epidemics, 6(8%) were neutral, while 11(15%) disagreed. Those willing to attend such training were 47(64%), 15(20%) were neutral and 12(16%) were unwilling.

Impact on Institutions, Supplies and Outpatient Clinics

Forty-two (84%) centres had designated isolation wards but only 2(4%) had COVID-19 positive children on admission and none had managed COVID-19 positive children with surgical condition in their facility at the time of this survey. Majority of centres had low perception of adequacy of PPE for theatre staff both at the time of survey and at 3 months afterwards as depicted in Figure 3. Ratings of how institutions are coping with the COVID-19 pandemic was low in 33(66%), intermediate in 14(28%) and high in 3(6%) centres. Forty (80%) centres do not offer hospital powered telemedicine services for patients follow up despite lockdown on outpatient clinics.

Impact on Academic Training Programs

Twenty-nine (58%) centres had suspended academic training during the pandemic, 13(26%) engaged “WhatsApp” chat rooms, while 3(6%) made use of Video-conferencing and 5(10%) still carried out their academic training through physical meetings but with social distancing.

DISCUSSION

Pandemics usually run ravaging course with unpredictable health, social and economic disruptions (4). The impact can be difficult to assess and is an area of active research. While

the direct health impact of pandemics can be catastrophic, the indirect impact driven by depletion of resources and reduced assess to routine care can lead to further increase in morbidity and mortality (4).

COVID-19 pandemic is rapidly evolving with unprecedented impact on global health systems. China, and later the United States, Italy and other European countries became hotspots for the virus after reporting their first cases in December 2019 and January 2020 respectively (2,5,6). Travellers from these regions brought in the disease to Africa, including Nigeria in February 2020 (7,8) with a rapid expansion in the number of cases in sub-Saharan Africa (9). The World Health Organization formally declared COVID-19 outbreak a pandemic on 11th March with 634 813 total confirmed cases as at 29th March, 2020 (10,11). This has sparked various adaptations in healthcare responses and management, with unpredictable outcomes heightened by depletion of resources. For example, the only paediatric surgery care facility in Liberia run by Médecins Sans Frontières (MSF) has been temporarily suspended due to travel restrictions (12).

Children are more susceptible to viral respiratory diseases but ironically, statistics on COVID-19 have shown low incidence in this age group. An analysis of 72 314 cases of COVID-19 from the Chinese Centre for Disease Control and Prevention showed a low incidence in children with those younger than 10 years accounting for only 1% of cases (13). A recent observational cohort study of 36 children with COVID-19 found that all the patients had mild (47%) or moderate (53%) type of COVID-19 with large proportion (28%) being asymptomatic (14). Thus, it was initially thought that this clinical pattern of COVID-19 in the paediatric population could make children important facilitators of viral transmission, and may thus place providers of health care in them at increased risk of infection (14–16).

Our survey showed that majority of the paediatric surgeons have stopped operating on all elective conditions in both public and private tertiary health institutions to minimise contact with potential carriers of the virus and conserve resources. This is consistent with the American College of Surgeons COVID-19: Elective Case Triage Guidelines for Surgical Care which recommended that surgery should be performed only if delaying the procedure is likely to prolong hospital stay, increase the likelihood of later hospital admission or cause harm to the patient (17). A recent article recognises the higher frequency of highly symptomatic patients on the elective operation list in LMICs compared to HICs but still advocates that truly elective operations should be postponed to preserve PPE, staff and facility capacity as important resources during a surge response (18).

The ACS advocates that "children who have failed attempts at medical management of a surgical condition should be considered for surgery" (17). Our study revealed an increased uptake of non-operative management of some surgical conditions such as intussusception, uncomplicated appendicitis and some cases of trauma. This modality of care was probably adopted to reduce exposure to surgery during the pandemic. Outcome of these modifications in management protocol may be subject to future research.

Some suspended elective cases had presented as emergencies. They included incarcerated inguinoscrotal hernias, sub-acute appendicitis and previously decompressing anovestibular fistula that developed partial obstruction. This is an indirect impact of the pandemic due to reduced assess to routine care in these patients. Official tele-medicine platforms for follow up care of patients may aid early detection of complications or other needs for hospital visits while elective surgeries remain suspended, outpatient clinics locked down and patients are being given long appointments. Few centres in our survey have an official tele-medicine platform for follow up care of patients especially during this period of COVID-19 pandemic. The ACS recommends that tele-medicine and tele-consult services should be used for patient and

physician interaction when available (19). There is an urgent need to upscale tele-medicine services and also to develop protocols for handling backlog of elective surgeries in children in LMIC once the pandemic recedes.

In this report, all centres continued to operate on emergencies and there was consistent monthly average number of surgeries from November 2019 to February 2020 but a sharp decline in March 2020. This corresponded with the period of social and economic disruptions which followed the first confirmed case of COVID-19 in Nigeria reported on 27th February 2020 (8,20). This data shows the need to adopt consensus guidelines tailored to maintain emergency services in LMIC during this pandemic.

Majority of centres had designated isolation wards, but only 4% of them had children with the virus and none had managed a COVID-19 positive child with surgical condition. Although local statistics of incidence in children was not available in our literature search, our finding is suggestive of a low incidence of confirmed COVID-19 in children in Nigeria which is consistent with global data (13,21). Despite this low incidence in children, about half of paediatric surgeons in our survey feel unsafe operating on patients during this period and more are unwilling to operate on confirmed COVID-19 patients. This may be based on the perceived higher risk of transmissibility of the virus from children to health care workers (14–16). More recent review articles have however refuted this perception with findings that children are not more likely than adults to spread the virus (22,23).

Majority of centres had suspended academic training during this pandemic. Very few made use of Video-conferencing. Poor internet connectivity and high cost of subscription in sub-Sahara Africa may be partly responsible for this poor uptake of video communication (24,25). Online chat rooms are generally accessible and may be explored as viable media alternative.

This research is survey based with attendant limitation of recall. Information obtained is opinion of the surgeons and does not necessarily represent best practices. Contraction of the Likert scale to 3 points to simplify the results for analysis may have led to some inaccuracy. The study however does provide information on early impact of COVID-19 pandemic on paediatric surgery in Nigeria to help in beginning to plan towards restarting services and handling future unprecedented situations.

CONCLUSION

The COVID-19 pandemic has resulted in cessation of elective surgeries and a sharp decline in the number of emergency surgeries performed on children in Nigeria. It is crucial that plans begin on how to handle the backlog of surgeries that would have been created. This may well be institution specific but adequate PPE need to be provided to ensure safety of providers. Further, electronic communication with patients and professional colleagues during the pandemic may help improve the surgical care of children. A follow up study is planned to identify further impacts of the pandemic on children's surgical care.

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FIGURES

Figure 1: Cluster bar chart of the mean number of surgeries over 5 months

Figure 2: Perception of safety of paediatric surgeons and willingness to operate

Figure 3: Perception of adequacy of PPE for theatre staff now and in 3 months

Figure 1: Cluster column chart of the mean number of surgeries over 5 months

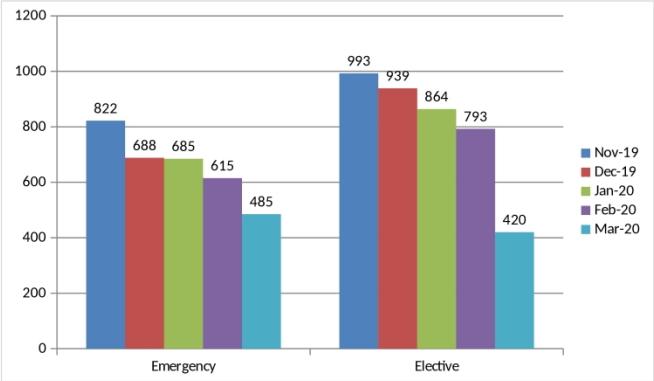

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Figure 2: Perception of safety of paediatric surgeons and willingness to operate

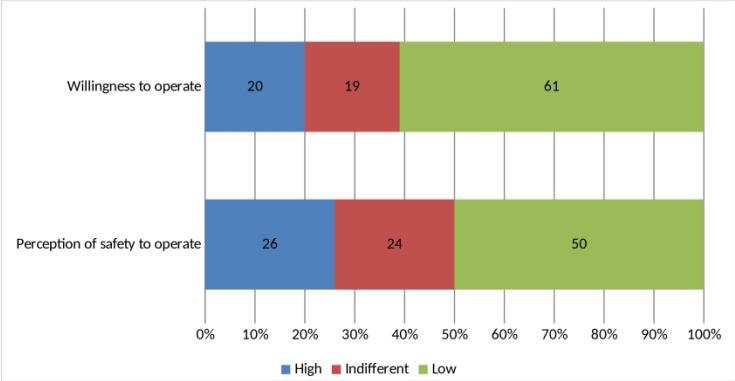

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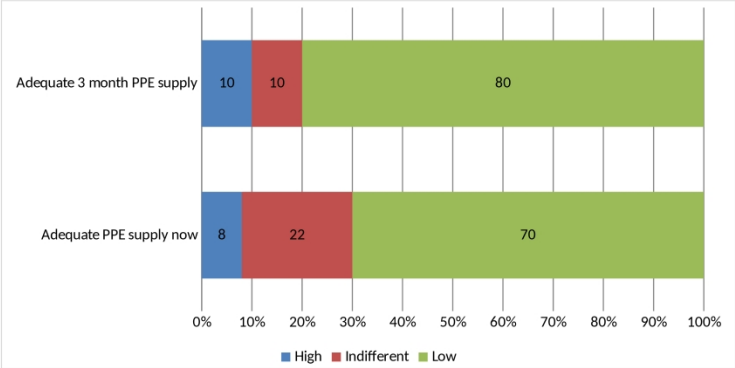
Figure 3: Perception of adequacy of PPE for theatre staff now and in 3 months



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Appendix 1

Questionnaire

Title: Early Impact of Covid-19 Pandemic on Paediatric Surgical Practise in Nigeria: a National Survey of Paediatric Surgeons.

Dear colleague, we are conducting a national survey to assess the "Early Impact of Covid-19 Pandemic on Paediatric Surgical Practise in Nigeria."

Kindly spare some time to complete this questionnaire. Some of the questions are centre based. All information provided shall be treated with strict confidentiality.

Complete and submit this form only if you consent to information provided being used for the purposes of research.

Thank you.

SECTION A. SOCIO-DEMOGRAPHIC DETAILS

1. Gender: Male ( ) Female ( )

2. Age at last birthday (years): …….

3. Cadre: Consultant ( ) Senior Registrar ( )

4. Years of practice of paediatric surgery specialty: ……..

5. Location of practice (e.g. Lagos state): ……..

6. Current place of work: ……

7. Type of current place of work: Public Hospital ( ) Private Hospital ( )

8. Category of Health Facility:

Teaching Hospital ( ) Federal Medical Centre ( ) General/specialist Hospital ( )

SECTION B. IMPACT ON SURGERIES

1. What is the average number of elective surgeries performed in your centre during the following months?

November 2019	1-10 ( )	11-20 ( )	21-30 ( )	> 30 ( )
December 2019	1-10 ( )	11-20 ( )	21-30 ( )	> 30 ( )
January 2020	1-10 ( )	11-20 ( )	21-30 ( )	> 30 ( )
February 2020	1-10 ( )	11-20 ( )	21-30 ( )	> 30 ( )
March 2020	1-10 ( )	11-20 ( )	21-30 ( )	> 30 ( )

2. Do you still take elective surgeries in your hospital? Yes ( ) No ( )

If No, how long have you stopped? <1 week ( ) 1-2 weeks ( ) 3-4 weeks ( ) >4weeks ( )

3. If you have suspended elective surgeries due to COVID-19, have you had any of such cases present as emergency? Yes ( ) No ( )

If yes, kindly list the number of such cases in your centre, the diagnosis and the age of patient(s):

……
……
……

4. What is the average number of emergency surgeries performed in your centre during the following months?

November 2019	1-10 ( )	11-20 ( )	21-30 ( )	> 30 ( )
December 2019	1-10 ( )	11-20 ( )	21-30 ( )	> 30 ( )
January 2020	1-10 ( )	11-20 ( )	21-30 ( )	> 30 ( )
February 2020	1-10 ( )	11-20 ( )	21-30 ( )	> 30 ( )
March 2020	1-10 ( )	11-20 ( )	21-30 ( )	> 30 ( )

5. State your unit protocol for the management of urgent cases such as cancers, symptomatic hernias in this period of COVID-19:

☐Operate immediately

☐Delayed intervention

☐See as follow up

☐Masterly inactivity

Please answer some of the following questions using a Likert scale of 1-5

(1- Strongly agree, 2- agree, 3- indifferent, 4- disagree and 5- strongly disagree)

SECTION C. IMPACT ON SURGEONS

1. I feel safe operating on patients during the COVID-19 pandemic:

1( ) 2( ) 3( ) 4( ) 5( )

2. I am willing to operate on a confirmed COVID-19 positive patients

1( ) 2( ) 3( ) 4( ) 5( )

3. Has any member of your surgical team tested positive to COVID-19?

Yes ( ) No ( ). If yes, how many? ……..

4. Have you had any formal training on COVID-19 care and preparedness?

Yes ( ) No ( )

5. Paediatric surgeons need to have additional training in management of surgical patients during epidemics 1( ) 2( ) 3( ) 4( ) 5( )

6. I am willing to attend such training as in 5 above

1( ) 2( ) 3( ) 4( ) 5( )

SECTION D. CHANGES IN MANAGEMENT MODALITY

How has Covid-19 influenced your modality of management of following conditions?

1. Acute appendicitis

☐A change to conservative management with antibiotics

☐Operative (Open) as usual

☐Operative (Laparoscopy) as usual

☐Operative (Laparoscopy with HME filter and CO2 filter)

☐Change from Laparoscopic to open surgery

2. Uncomplicated intussusception

☐Non operative reduction as usual

☐Operative reduction as usual

☐Change from operative to non-operative reduction

☐Change from non-operative to operative reduction

3. Trauma

☐No change in management modality

☐Attempt to be more conservative in management

Please answer some of the following questions using a Likert scale of 1-5

(1- Strongly agree, 2- agree, 3- indifferent, 4- disagree and 5- strongly disagree)

SECTION E. IMPACT ON INSTITUTIONS, SUPPLIES AND OUT-PATIENT CLINICS

1. Do you have designated isolation wards for COVID-19 patients in your hospital?

Yes ( ) No ( )

2. Do you have children with COVID-19 being managed in your hospital?

Yes ( ) No ( )

3. Have you managed COVID-19 positive children with surgical condition in your centre? Yes ( ) No ( )

If Yes, how many of such patients? …….

4. Do you still run out-patient clinics in your hospital?

Yes ( ) No ( )

5. Do you have an official telemedicine platform for patient follow up in your hospital? Yes ( ) No ( )

6. We have adequate supply of PPE for every surgery now:

1( ) 2( ) 3( ) 4( ) 5( )

7. We have adequate supply of PPE for every surgery for the next 3 months:

1( ) 2( ) 3( ) 4( ) 5( )

8. My hospital is coping well with the COVID-19 pandemic:

1( ) 2( ) 3( ) 4( ) 5( )

SECTION F. IMPACT ON ACADEMIC TRAINING

1. How are you carrying out academic programs in your hospital during this COVID-19 pandemic?

☐WhatsApp chatting

☐Video conferencing

☐Physical meetings with social distancing

☐No academic activity at the moment

Thank you for your time.

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TITLE PAGE

Title:

Early Impact of COVID-19 Pandemic on Paediatric Surgical Practice in Nigeria: a National Survey of Paediatric Surgeons.

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ABSTRACT

Introduction The novel Coronavirus disease has had significant impact on healthcare globally. Knowledge of this virus is evolving, definitive care is not yet known, and mortality is increasing. We assessed its initial impact on paediatric surgical practice in Nigeria, creating a benchmark for recommendations and future reference.

Methods Survey of 120 paediatric surgeons from 50 centres to assess socio-demographics and specific domains of impact of COVID-19 on their services and training in Nigeria. Valid responses were represented as categorical data and presented in percentages. Duplicate submissions for centres were excluded by combining and taking the mean of responses from centres with multiple respondents.

Results Response rate was 74(61%). Forty-six(92%) centres had suspended elective surgeries. All centres continued emergency surgeries but volume reduced in March by 31%. Eleven(22%) centres reported 13 suspended elective cases presenting as emergencies in March, accounting for 3% of total emergency surgeries. Twelve(24%) centres adopted new modalities for managing selected surgical conditions: non-operative reduction of intussusception in 1(2%), antibiotic management of uncomplicated acute appendicitis in 5(10%), more conservative management of trauma and replacement of laparoscopic appendectomy with open surgery in 3(6%) respectively. Low perception of adequacy of Personal Protective Equipment (PPE) was reported in 35(70%) centres. Forty(80%) centres did not offer telemedicine for patients follow up. Twenty-nine(58%) centres had suspended academic training. Perception of safety to operate was low in 37(50%) respondents, indifferent in 24% and high in 26%.

Conclusion Majority of paediatric surgical centres reported cessation of elective surgeries whilst continuing emergencies. There was however an acute decline in the volume of emergency surgeries. Adequate PPE needs to be provided and preparations towards handling

backlog of elective surgeries once the pandemic recedes. Further study is planned to more conclusively understand the full impact of this pandemic on children's surgery.

Key words: pandemic, COVID-19, children's surgery.

What is already known

Anecdotal evidence suggests that elective surgeries in children have been suspended due to COVID-19 pandemic.

What this study adds

Our study shows that:

1. Most centres (92%) had suspended elective surgeries.
2. Emergency surgeries were also impacted with reduction from pre-COVID volumes by one-third in March 2020.
3. Some suspended elective cases developed emergent problems and presented as emergencies.
4. One-fifth of centres for the first time adopted non-operative modalities of treatment for selected emergent conditions.

BACKGROUND

Coronavirus disease 19 (COVID-19) is a highly transmissible novel viral illness, caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (1). It was reported to have emerged in Wuhan, China, in December 2019 but later spread to other parts of China and other countries of the world (2). This disease poses a huge challenge to health care systems around the world. The U.S. Department of Health and Human Services stated in its 2017 Pandemic Influenza plan update that "emerging viral pandemics can place extraordinary and sustained demands on public health and health systems and on providers of essential community services" (3). The effect may be more profound in regions with already limited resources and fragile health infrastructure. The aim of this study was to carry out a survey of paediatric surgeons in a resource limited setting to assess early effects of the COVID-19 pandemic on their practice in the initial stages of the outbreak. Data obtained would be used for recommendations and future reference.

METHODS

Relevant information was obtained from paediatric surgeons (consultants and senior registrars) currently practising in Nigeria, using a pre-tested questionnaire (Appendix 1) designed on Microsoft Word version 10 (Microsoft Seattle, WA, USA) and transcribed to google form. The questions were based on 5-point Likert scale (Strongly agree, agree, neither agree nor disagree, disagree, strongly disagree). We circulated the forms to the predetermined group of specialists by email and online chat rooms and kept them open from 10th to 17th April 2020. Daily reminders were also sent.

Participants were required to provide socio-demographic data, information on patient traffic and decision on management of specific conditions, availability of PPE, impact on surgeon's psyche, their academic programs and institutions infrastructure.

For the purpose of analysis, the 5-point Likert scale was reduced to 3 points. Strongly agree and agree were merged as agree, neither agree nor disagree was retained as neutral, disagree and strongly disagree were merged as disagree.

Duplicate submissions for centres were excluded by combining and taking the mean of responses from centres with multiple responses.

Responses were analysed using SPSS version 22 and presented as categorical data and percentages.

Patient and Public Involvement statement: This research was done without patient involvement. Patients were not invited to comment on the study design and were not consulted to develop patient relevant outcomes or interpret the results. Patients were not invited to contribute to the writing or editing of this document for readability or accuracy.

Ethics Approval: Obtained from the Health Research Ethics Committee of Olabisi Onabanjo University Teaching Hospital, Sagamu, Ogun State, Nigeria (OOUTH/HREC/339/2020AP).

RESULTS

Demographics

A total of 120 paediatric surgeons from 50 centres were sent the survey. Eighty-three paediatric surgeons responded but 74 forms were adequately completed resulting in a response rate of 61%. The 74 completed responses represented the 50 centres across the country. Table 1 shows the socio-demographic characteristics of respondents.

Table: 1 Socio-demographic characteristics of respondents

Characteristics of respondents	Scores	Percentage
1.Cadre	N=74	
Consultant	45	61
Senior-Registrar	29	39
2.Gender	N=74	
Male	62	84
Female	12	16
3.Work place	N=50	
Public	48	96
Private	2	4
4.Type of Health facility	N=50	
Teaching hospital	39	78
Federal Medical Centre	10	20
General/Specialist Hospital	1	2

Impact on Surgeries

Elective surgeries had been suspended in 46(92%) centres at the time of this survey. There was a steady decline in the average number of elective surgeries done over 5 months between November 2019 with 993(25% of 5 month total) and March 2020 with 420(10% of total) cases. Similar trend was observed with emergency surgeries which reduced from 822(25% of 5 month total) in November 2019 to 485(15% of total) in March 2020. Comparatively, there were more elective than emergency surgeries per month until March (Figure 1).

Twenty(40%) centres suspended their elective surgeries less than 2 weeks prior to the survey in April, 26(52%) centres stopped a month earlier and 4(8%) had suspended their elective list for over a month.

Adverse clinical outcomes

Eleven(22%) centres reported at least one of the elective cases suspended due to COVID-19 pandemic presenting as emergency in March. There were 13 of such patients accounting for an estimated 3% of the total emergency surgeries for the month. They included inguinoscrotal hernias (10) with obstruction, sub-acute appendicitis (2) and previously decompressing anovestibular fistula with intestinal obstruction (1).

Changes in Management Modality

Nine(18%) centres have newly adopted non-operative modalities for managing selected surgical conditions in response to the pandemic. One(2%) centre adopted non-operative reduction of intussusception while 5(10%) centres adopted management of uncomplicated acute appendicitis with antibiotics and 3(6%) took a more conservative approach to management of trauma. Three(6%) centres replaced laparoscopic appendectomy with open surgery.

Protocol for the management of urgent cases such as cancers, symptomatic hernias in the early period of COVID-19 was to continue to immediately operate in 31(62%) centres, delayed intervention in 12(24%), watchful waiting in 2(4%) and follow up in 5(10%).

Impact on Surgeons

Paediatric surgeons' perception of safety to operate during the pandemic and their willingness to operate on COVID-19 positive patients are shown in figure 2. Perception of safety to operate

rated low in half of respondents. No member of the surgical teams had tested positive for COVID-19 at the time of the survey.

Fifty-seven(77%) agreed to a need for paediatric surgeons to have additional training in management of surgical patients during epidemics, 6(8%) were neutral, while 11(15%) disagreed. Those willing to attend such training were 47(64%), 15(20%) were neutral and 12(16%) were unwilling.

Impact on Institutions, Supplies and Outpatient Clinics

Forty-two(84%) centres had designated isolation wards but only 2(4%) had COVID-19 positive children on admission and none had managed COVID-19 positive children with surgical conditions in their facility at the time of this survey. Majority of centres had low perception of adequacy of PPE for theatre staff both at the time of survey and at 3 months afterwards as depicted in Figure 3. Ratings of how institutions are coping with the COVID-19 pandemic was low in 33(66%), intermediate in 14(28%) and high in 3(6%) centres. Forty (80%) centres do not offer hospital powered telemedicine services for patients follow up despite lockdown on outpatient clinics.

Impact on Academic Training Programs

Twenty-nine(58%) centres had suspended academic training during the pandemic, 13(26%) engaged “WhatsApp” chat rooms, while 3(6%) made use of Video-conferencing and 5(10%) still carried out their academic training through physical meetings but with social distancing.

DISCUSSION

Pandemics usually run ravaging courses with unpredictable health, social and economic disruptions (4). The impact can be difficult to assess and is an area of active research. While

the direct health impact of pandemics can be catastrophic, the indirect impact driven by depletion of resources and reduced access to routine care can lead to further increase in morbidity and mortality (4).

COVID-19 pandemic is rapidly evolving with unprecedented impact on global health systems. China, and later the United States, Italy and other European countries became hotspots for the virus after reporting their first cases in December 2019 and January 2020 respectively (2,5,6). Travellers from these regions brought in the disease to Africa, including Nigeria in February 2020 (7,8) with a rapid expansion in the number of cases in sub-Saharan Africa (9). The World Health Organization formally declared COVID-19 outbreak a pandemic on 11th March with 634 813 total confirmed cases as at 29th March, 2020 (10,11). This has sparked various adaptations in healthcare responses and management, with unpredictable outcomes heightened by depletion of resources. For example, the only paediatric surgery care facility in Liberia run by Médecins Sans Frontières (MSF) has been temporarily suspended due to travel restrictions (12).

Children are more susceptible to viral respiratory diseases but ironically, statistics on COVID-19 have shown low incidence in this age group. An analysis of 72 314 cases of COVID-19 from the Chinese Centre for Disease Control and Prevention showed a low incidence in children with those younger than 10 years accounting for only 1% of cases (13). A recent observational cohort study of 36 children with COVID-19 found that all the patients had mild (47%) or moderate (53%) types of COVID-19 with a large proportion (28%) being asymptomatic (14). Thus, it was initially thought that this clinical pattern of COVID-19 in the paediatric population could make children important facilitators of viral transmission, and may thus place providers of health care in them at increased risk of infection (14–16).

Our survey showed that majority of the paediatric surgeons have stopped operating on all elective conditions in both public and private tertiary health institutions to minimise contact with potential carriers of the virus and conserve resources. This is consistent with the American College of Surgeons COVID-19: Elective Case Triage Guidelines for Surgical Care which recommended that surgery should be performed only if delaying the procedure is likely to prolong hospital stay, increase the likelihood of later hospital admission or cause harm to the patient (17). A recent article recognises the higher frequency of highly symptomatic patients on the elective operation list in LMICs compared to HICs but still advocates that truly elective operations should be postponed to preserve PPE, staff and facility capacity as important resources during a surge response (18).

The ACS advocates that "children who have failed attempts at medical management of a surgical condition should be considered for surgery" (17). Our study revealed an increased uptake of non-operative management of some surgical conditions such as intussusception, uncomplicated appendicitis and some cases of trauma. This modality of care was probably adopted to reduce exposure to surgery during the pandemic. Outcome of these modifications in management protocol may be subject to future research.

Some suspended elective cases had presented as emergencies. They included incarcerated inguinoscrotal hernias, sub-acute appendicitis and previously decompressing anovestibular fistula that developed partial obstruction. There is also potential of poorer outcomes for patients with cancer and other urgent cases that have been cancelled but may not necessarily return as emergency. The effect of delay on the outcomes for these patients may not be recognised until a later date (or at all if they die without re-accessing paediatric surgical care at the tertiary hospitals). These are indirect impacts of the pandemic due to reduced access to routine care. Official tele-medicine platforms for follow up care of patients may aid early detection of complications or other needs for hospital visits while elective surgeries remain suspended,

outpatient clinics locked down and patients are being given long appointments. Few centres in our survey have an official tele-medicine platform for follow up care of patients especially during this period of COVID-19 pandemic. The ACS recommends that tele-medicine and tele-consult services should be used for patient and physician interaction when available (19). There is an urgent need to upscale tele-medicine services and also to develop protocols for handling backlog of elective surgeries in children in LMIC once the pandemic recedes.

In this report, all centres continued to operate on emergencies and there was consistent monthly average number of surgeries from November 2019 to February 2020 but a sharp decline in March 2020. This corresponded with the period of social and economic disruptions which followed the first confirmed case of COVID-19 in Nigeria reported on 27th February 2020 (8,20). This data shows the need to adopt consensus guidelines tailored to maintain emergency services in LMIC during this pandemic. Follow up studies may also evaluate the case mix of emergency surgeries during the period of decline and determine if certain categories of diseases were more affected than others, e.g. neonates with congenital anomalies are more likely to be dying in the community as a result of reduced access to paediatric surgical care during the pandemic.

Majority of centres had designated isolation wards, but only 4% of them had children with the virus and none had managed a COVID-19 positive child with surgical condition. Although local statistics of incidence in children was not available in our literature search, our finding is suggestive of a low incidence of confirmed COVID-19 in children in Nigeria which is consistent with global data (13,21). Despite this low incidence in children, about half of paediatric surgeons in our survey feel unsafe operating on patients during this period and more are unwilling to operate on confirmed COVID-19 patients. This may be based on the perceived higher risk of transmissibility of the virus from children to health care workers (14–16). More recent review articles have however refuted this perception with findings that children are not

more likely than adults to spread the virus (22,23). Also, no paediatric surgeon tested positive to COVID-19 at the time of this survey. Although anecdotal evidence is that no surgeon had been tested at the time of our survey, as our National Centre for Disease Control (NCDC) guideline is to test symptomatic individuals and close contacts of confirmed patients (24).

Majority of centres had suspended academic training during this pandemic. Very few made use of Video-conferencing. Poor internet connectivity and high cost of subscription in sub-Saharan Africa may be partly responsible for this poor uptake of video communication (25,26). Online chat rooms are generally accessible and may be explored as viable media alternatives.

This research is survey based with attendant limitation of recall. Information obtained is opinion of the surgeons and does not necessarily represent best practices. Only surgeons were interviewed since the teams in all the centres studied were led by surgeons and we felt their opinions would be representative in this early survey. The actual numbers of operations cancelled could not be ascertained in the present study. We shall however include anaesthetists, nurses and other colleagues and attempt to determine actual numbers of operations cancelled in our follow up study. Contraction of the Likert scale to 3 points to simplify the results for analysis may have led to some inaccuracy. The study however does provide information on early impact of COVID-19 pandemic on paediatric surgery in Nigeria to help in beginning to plan towards restarting services and handling future unprecedented situations.

CONCLUSION

The COVID-19 pandemic has resulted in cessation of elective surgeries and a sharp decline in the number of emergency surgeries performed on children in Nigeria. It is crucial that plans begin on how to handle the backlog of surgeries that would have been created. This may well be institution specific but adequate PPE needs to be provided to ensure safety of providers.

Further, electronic communication with patients and professional colleagues during the pandemic may help improve the surgical care of children. A follow up study is planned to identify further impacts of the pandemic on children's surgical care.

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FIGURES

Figure 1: Cluster bar chart of the mean number of surgeries over 5 months

Figure 2: Perception of safety of paediatric surgeons and willingness to operate

Figure 3: Perception of adequacy of PPE for theatre staff now and in 3 months

Figure 1: Cluster column chart of the mean number of surgeries over 5 months

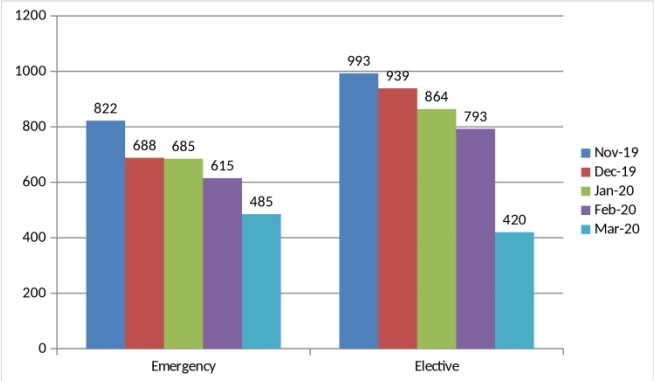

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Figure 2: Perception of safety of paediatric surgeons and willingness to operate

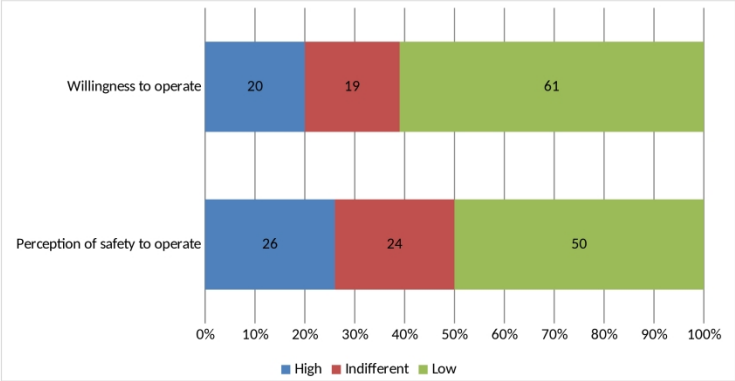

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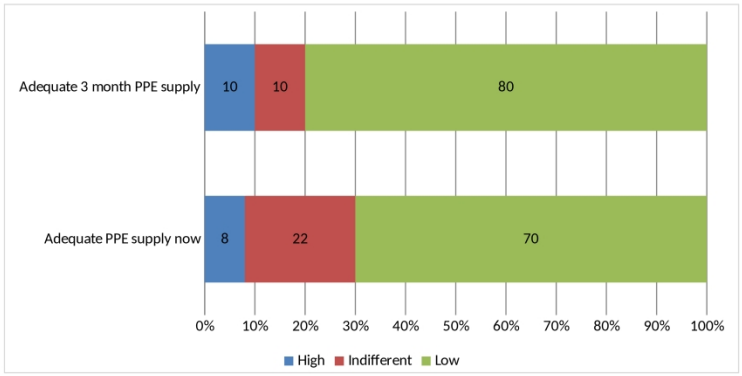
Figure 3: Perception of adequacy of PPE for theatre staff now and in 3 months



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Appendix 1

Questionnaire

Title: Early Impact of Covid-19 Pandemic on Paediatric Surgical Practise in Nigeria: a National Survey of Paediatric Surgeons.

Dear colleague, we are conducting a national survey to assess the "Early Impact of Covid-19 Pandemic on Paediatric Surgical Practise in Nigeria."

Kindly spare some time to complete this questionnaire. Some of the questions are centre based. All information provided shall be treated with strict confidentiality.

Complete and submit this form only if you consent to information provided being used for the purposes of research.

Thank you.

SECTION A. SOCIO-DEMOGRAPHIC DETAILS

1. Gender: Male ( ) Female ( )

2. Age at last birthday (years): …….

3. Cadre: Consultant ( ) Senior Registrar ( )

4. Years of practice of paediatric surgery specialty: ……..

5. Location of practice (e.g. Lagos state): ……..

6. Current place of work: ……

7. Type of current place of work: Public Hospital ( ) Private Hospital ( )

8. Category of Health Facility:

Teaching Hospital ( ) Federal Medical Centre ( ) General/specialist Hospital ( )

SECTION B. IMPACT ON SURGERIES

1. What is the average number of elective surgeries performed in your centre during the following months?

November 2019	1-10 ( )	11-20 ( )	21-30 ( )	> 30 ( )
December 2019	1-10 ( )	11-20 ( )	21-30 ( )	> 30 ( )
January 2020	1-10 ( )	11-20 ( )	21-30 ( )	> 30 ( )
February 2020	1-10 ( )	11-20 ( )	21-30 ( )	> 30 ( )
March 2020	1-10 ( )	11-20 ( )	21-30 ( )	> 30 ( )

2. Do you still take elective surgeries in your hospital? Yes ( ) No ( )

If No, how long have you stopped? <1 week ( ) 1-2 weeks ( ) 3-4 weeks ( ) >4weeks ( )

3. If you have suspended elective surgeries due to COVID-19, have you had any of such cases present as emergency? Yes ( ) No ( )

If yes, kindly list the number of such cases in your centre, the diagnosis and the age of patient(s):

……
……
……

4. What is the average number of emergency surgeries performed in your centre during the following months?

November 2019	1-10 ( )	11-20 ( )	21-30 ( )	> 30 ( )
December 2019	1-10 ( )	11-20 ( )	21-30 ( )	> 30 ( )
January 2020	1-10 ( )	11-20 ( )	21-30 ( )	> 30 ( )
February 2020	1-10 ( )	11-20 ( )	21-30 ( )	> 30 ( )
March 2020	1-10 ( )	11-20 ( )	21-30 ( )	> 30 ( )

5. State your unit protocol for the management of urgent cases such as cancers, symptomatic hernias in this period of COVID-19:

☐Operate immediately

☐Delayed intervention

☐See as follow up

☐Masterly inactivity

Please answer some of the following questions using a Likert scale of 1-5

(1- Strongly agree, 2- agree, 3- indifferent, 4- disagree and 5- strongly disagree)

SECTION C. IMPACT ON SURGEONS

1. I feel safe operating on patients during the COVID-19 pandemic:

1( ) 2( ) 3( ) 4( ) 5( )

2. I am willing to operate on a confirmed COVID-19 positive patients

1( ) 2( ) 3( ) 4( ) 5( )

3. Has any member of your surgical team tested positive to COVID-19?

Yes ( ) No ( ). If yes, how many? ……..

4. Have you had any formal training on COVID-19 care and preparedness?

Yes ( ) No ( )

5. Paediatric surgeons need to have additional training in management of surgical patients during epidemics 1( ) 2( ) 3( ) 4( ) 5( )

6. I am willing to attend such training as in 5 above

1( ) 2( ) 3( ) 4( ) 5( )

SECTION D. CHANGES IN MANAGEMENT MODALITY

How has Covid-19 influenced your modality of management of following conditions?

1. Acute appendicitis

☐A change to conservative management with antibiotics

☐Operative (Open) as usual

☐Operative (Laparoscopy) as usual

☐Operative (Laparoscopy with HME filter and CO2 filter)

☐Change from Laparoscopic to open surgery

2. Uncomplicated intussusception

☐Non operative reduction as usual

☐Operative reduction as usual

☐Change from operative to non-operative reduction

☐Change from non-operative to operative reduction

3. Trauma

☐No change in management modality

☐Attempt to be more conservative in management

Please answer some of the following questions using a Likert scale of 1-5

(1- Strongly agree, 2- agree, 3- indifferent, 4- disagree and 5- strongly disagree)

SECTION E. IMPACT ON INSTITUTIONS, SUPPLIES AND OUT-PATIENT CLINICS

1. Do you have designated isolation wards for COVID-19 patients in your hospital?

Yes ( ) No ( )

2. Do you have children with COVID-19 being managed in your hospital?

   Yes ( ) No ( )

3. Have you managed COVID-19 positive children with surgical condition in your centre? Yes ( ) No ( )

   If Yes, how many of such patients? …….

4. Do you still run out-patient clinics in your hospital?

   Yes ( ) No ( )

5. Do you have an official telemedicine platform for patient follow up in your hospital? Yes ( ) No ( )

6. We have adequate supply of PPE for every surgery now:

   1( ) 2( ) 3( ) 4( ) 5( )

7. We have adequate supply of PPE for every surgery for the next 3 months:

   1( ) 2( ) 3( ) 4( ) 5( )

8. My hospital is coping well with the COVID-19 pandemic:

   1( ) 2( ) 3( ) 4( ) 5( )

SECTION F. IMPACT ON ACADEMIC TRAINING

1. How are you carrying out academic programs in your hospital during this COVID-19 pandemic?

☐WhatsApp chatting

☐Video conferencing

☐Physical meetings with social distancing

☐No academic activity at the moment

Thank you for your time.