

Electronic Supplementary Material

Title: Impact of the COVID-19 Pandemic on Pediatric Surgical Volume in four Low- and Middle-Income Country Hospitals: Insights from an Interrupted Time Series Analysis

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Supplemental Table 1 Variables in the Data Collection Protocol

| Variable | Category | Variable Label |
|--------------------------|--------------|---|
| record_id | demographics | Record ID |
| site_country | demographics | Country |
| study_id | demographics | Study ID |
| dob | demographics | Date of birth (if known) |
| age_number | demographics | Age |
| age_units | demographics | Age Unit |
| sex | demographics | Sex |
| weight | demographics | Weight (kilograms) |
| admit_date | demographics | Date of admission |
| surgery_date | demographics | Date of surgery |
| transfer | demographics | Was the patient transferred from another health center? |
| existing_patient | demographics | Is this a new entry for an existing patient who has previously had an operation in this OR? |
| staged | demographics | Is this operation part of a planned or staged procedure? |
| time | demographics | Time of operation |
| prematurity | demographics | Was the patient born prematurely (born before 37 weeks of gestation)? |
| elective | surgeon | Was this an elective (planned) operation? |
| diagnosis_1 | surgeon | Diagnosis - 1 |
| diagnosis_2 | surgeon | Diagnosis - 2 |
| diagnosis_3 | surgeon | Diagnosis - 3 |
| diagnosis_4 | surgeon | Diagnosis - 4 |
| other_anorectal | surgeon | Specify Other Anorectal Disease |
| other_intestinal_atresia | surgeon | Specify Other Intestinal Atresia |
| other_esophageal_atresia | surgeon | Specify Other Esophageal Atresia |
| hypospadias_subtype | surgeon | Specify Hypospadias Subtype |
| other_urogenital | surgeon | Specify Urogenital Malformation |
| other_heart | surgeon | Specify Congenital Heart Disease |
| other_msk | surgeon | Specify Musculoskeletal Malformation |
| other_mmc | surgeon | Specify Spina Bifida Type |
| other_teratoma | surgeon | Specify Teratoma Site |
| other_abd_mass | surgeon | Specify Abdominal Mass or Tumor |
| other_ovarian | surgeon | Specify Ovarian Mass or Tumor |
| other_testicular | surgeon | Specify Testicular or Scrotal Mass or Tumor |
| other_soft_tissue | surgeon | Specify Soft Tissue Mass or Tumor |
| other_extremity | surgeon | Specify Extremity Mass or Tumor |
| other_lymphoma | surgeon | Specify Myeloproliferative Disorder |
| other_trauma | surgeon | Specify Trauma |
| other_burn | surgeon | Specify Burn Site |
| other_abscess_type | surgeon | Specify Skin & Soft Tissue Infection Type |
| other_abscess_location | surgeon | Specify Skin & Soft Tissue Infection Location |
| other_necfasc_type | surgeon | Specify Necrotizing Soft Tissue Infection Type |
| other_necfasc_location | surgeon | Specify Necrotizing Soft Tissue Infection Location |
| other_intestinal_perf | surgeon | Specify Other Intestinal Perforation |
| other_neonatal_sepsis | surgeon | Specify Neonatal Sepsis |
| post_op_complications | surgeon | Specify Post Operative Complication |
| other_post_op | surgeon | Specify Other Post Operative Complication |

| | | |
|--------------------------------|---------|---|
| other unspecified | surgeon | Specify Other |
| other foreign body | surgeon | Specify Other Foreign Body Location |
| other cns | surgeon | Specify CNS Mass or Tumor |
| other thoracic | surgeon | Specify Thoracic Mass or Tumor |
| other airway | surgeon | Specify Airway Disorder |
| other infectious | surgeon | Specify Infectious Disease |
| other infectious specify | surgeon | Specify Other Infectious Disease |
| other ldn | surgeon | Specify Lymphadenopathy |
| procedure 1 | surgeon | Procedure - 1 |
| procedure 2 | surgeon | Procedure - 2 |
| procedure 3 | surgeon | Procedure - 3 |
| procedure 4 | surgeon | Procedure - 4 |
| procedure 5 | surgeon | Procedure - 5 |
| specify_small_bowel_re sect | surgeon | Specify Small Bowel Segment |
| other small bowel seg | surgeon | Specify Other Small Bowel Segment |
| pull through type | surgeon | Specify Pull-Through Type |
| specify anoplasty | surgeon | Specify Other Anoplasty (ex: cloacal exstrophy repair) |
| specify gastroschisis | surgeon | Specify Gastroschisis Repair Type |
| specify omphalocele | surgeon | Specify Omphalocele Repair Type |
| specify choledochal | surgeon | Specify Choledochal Cyst Excision Type |
| specify hernia | surgeon | Specify Herniorrhaphy Site |
| specify hypospadias | surgeon | Specify Hypospadias Reconstruction Technique |
| specify urogenital | surgeon | Specify Complex Urogenital Repair Procedure |
| specify abdominal | surgeon | Specify Abdominal Mass Site |
| specify skin graft | surgeon | Specify Skin Graft Site |
| specify osteo | surgeon | Specify Osteomyelitis Site |
| specify thoracic | surgeon | Specify Thoracic Procedure |
| specify gastric | surgeon | Specify Gastric Procedure |
| specify hepatic | surgeon | Specify Hepatic Procedure |
| specify pancreatic | surgeon | Specify Pancreatic Procedure |
| specify splenic | surgeon | Specify Splenic Procedure |
| specify kidney | surgeon | Specify Kidney Procedure |
| specify adrenal | surgeon | Specify Other Adrenal Procedure |
| specify vascular | surgeon | Specify Vascular Procedure |
| specify heart | surgeon | Specify Congenital Heart Repair |
| specify msk | surgeon | Specify Musculoskeletal Procedure |
| specify cns | surgeon | Specify Central Nervous System Procedure |
| specify other | surgeon | Specify Other Procedure |
| primary surgeon | surgeon | Primary surgeon type |
| assistant surgeons | surgeon | Assistant Surgeons (select all that apply) |
| surgical trainee present | surgeon | Was a surgical trainee present? |
| essential equipment_s | surgeon | Were necessary surgical equipment missing? |
| missing list_s | surgeon | Which resources were not available? (select all that apply) |
| other equipment_s | surgeon | Specify other equipment not available |
| other resources_s | surgeon | Specify other resources not available |
| laparoscopy available | surgeon | Was laparoscopy available for this operation? |
| laparoscopy used | surgeon | Was laparoscopy used for this operation? |

| | | |
|---------------------------|----------------|---|
| lap would have used | surgeon | Would you have considered using laparoscopy if it was available? |
| laparoscopy issues | surgeon | Were there any problems using laparoscopy during this case? |
| lap issues description | surgeon | Describe the problems with laparoscopy that were encountered: |
| lap why not | surgeon | Why wasn't laparoscopy used during this operation? |
| lap why not desc | surgeon | List other reason laparoscopy wasn't used: |
| anaesthesia provider | anaesthetist | Anaesthesia provider (select all that apply) |
| anaesthesia type | anaesthetist | Anaesthesia type (select all that apply) |
| anaesthesia gen specify | anaesthetist | Specify the type of general anesthesia used? (Select all that apply) |
| anaesthesia trainee | anaesthetist | Was an anaesthesia trainee present? |
| essential equipment a | anaesthetist | Were necessary anaesthesia equipment and / or drugs missing? |
| missing list a | anaesthetist | Which resources were not available? (select all that apply) |
| other resources a | anaesthetist | Specify other resources not available |
| asa | anaesthetist | ASA Class |
| preop temp | anaesthetist | Pre-Operative Temperature (degrees Celsius) |
| sepsis | anaesthetist | Sepsis in 48 hours prior to surgery? |
| sepsis specify | anaesthetist | How was sepsis diagnosed? (select all that apply) |
| sirs criteria 1 | anaesthetist | SIRS criteria by age group |
| blood transfusion | anaesthetist | Did the patient receive a blood transfusion? |
| blood_transfusion_specify | anaesthetist | Specify when the patient received blood transfusion. (select all that apply) |
| oxygen | anaesthetist | Did the patient receive supplemental oxygen? |
| oxygen specify | anaesthetist | Specify when the patient received oxygen. (select all that apply) |
| pre op abx | anaesthetist | Did the patient receive antibiotics? |
| pre op abx specify | anaesthetist | Specify when the patient received antibiotics. (select all that apply) |
| safety checklist | anaesthetist | Safety Checklist Used in OR? |
| postop temp | anaesthetist | Post-Operative Temperature (degrees Celsius) |
| discharge date | discharge | Date of discharge |
| icu | discharge | Did the patient require ICU care post-operatively? |
| icu no | discharge | Did the patient require higher level of care, but ICU was not available? |
| icu duration | discharge | How many days was the patient admitted to the ICU? |
| post op abx | discharge | Antibiotics given post-operatively? |
| post op sepsis | discharge | Post-operative sepsis? |
| post op sepsis specify | discharge | How was sepsis diagnosed? (select all that apply) |
| sirs criteria 2 | discharge | SIRS criteria by age group |
| wound infection | discharge | Post operative surgical site infection? |
| re operation | discharge | Did the patient need another operation this admission? |
| discharge status | discharge | Status at discharge |
| death on table | discharge | Was this an on-table death? |
| wait time | socioeconomics | How long did the child wait to have the operation? |
| hospital cost | socioeconomics | Out of pocket DIRECT medical cost of hospitalization (hospital stay, procedures, medical and diagnostic tests, medications, supplies, etc.) |
| travel cost | socioeconomics | Out of pocket INDIRECT medical cost of hospitalization (transportation, feeding, employing an attendant, etc.) |
| borrow money | socioeconomics | Did your household have to borrow money to pay for this hospitalization? |
| sell possessions | socioeconomics | Did your household have to sell any land or possessions to pay for this hospitalization? |
| lost wages | socioeconomics | Did your household lose wages as result of this hospitalization? |
| lost job | socioeconomics | Did you or anyone in your household permanently lose a job as a result of this hospitalization? |

| | | |
|---------------|----------------|---|
| annual income | socioeconomics | Annual family income BEFORE this hospitalization |
| subsidy | socioeconomics | Did your child receive any government subsidy to help pay for this operation? |
| subsidy_value | socioeconomics | What was the approximate monetary value of this subsidy? |
| travel time | socioeconomics | How long did it take you to reach the hospital when you started travelling? |

Supplemental Table 2 Interrupted Time Series Analysis Output

| | Total | | | Elective | | | Emergency | | |
|----------------------|-----------------------------|---------------|-------------------|-----------------------------|---------------|-------------------|-----------------------------|---------------|-------------------|
| | <i>Volume (cases/month)</i> | <i>95% CI</i> | <i>p-value</i> | <i>Volume (cases/month)</i> | <i>95% CI</i> | <i>p-value</i> | <i>Volume (cases/month)</i> | <i>95% CI</i> | <i>p-value</i> |
| All Sites | | | | | | | | | |
| <i>Baseline</i> | 55.3 | -7.9, 118.5 | 0.083 | 40.7 | -1.5, 82.8 | 0.058 | 15.8 | -11.9, 43.5 | 0.251 |
| <i>Pre-COVID Δ</i> | 20.8 | 13.5, 28.2 | <0.001* | 9.9 | 5.6, 14.2 | <0.001* | 10.9 | 7.6, 14.3 | <0.001* |
| <i>Immediate Δ</i> | -109.8 | -195.5, -24.2 | 0.014* | -73.3 | -116.6, -30.0 | 0.002* | -36.0 | -70.9, -1.2 | 0.043* |
| <i>Post-COVID Δ</i> | 1.0 | -6.3, 8.2 | 0.784 | 3.2 | -1.5, 7.9 | 0.175 | -2.3 | -6.2, 1.5 | 0.220 |
| <i>Pre- vs Post-</i> | -19.9 | -30.2, -9.6 | 0.001* | -6.7 | -13.1, -0.4 | 0.038* | -13.3 | -19.1, -7.4 | <0.001* |
| Burkina Faso | | | | | | | | | |
| <i>Baseline</i> | 37.7 | -7.1, 82.5 | 0.095 | 28.3 | 15.4, 41.2 | <0.001* | 25.2 | -5.6, 56.0 | 0.104 |
| <i>Pre-COVID Δ</i> | 12.1 | 6.2, 18.0 | <0.001* | -0.2 | -2.5, 2.2 | 0.878 | 10.2 | 5.9, 14.6 | <0.001* |
| <i>Immediate Δ</i> | -49.5 | -100.6, 1.6 | 0.057 | -5.0 | -30.9, 20.9 | 0.692 | -36.1 | -71.4, -0.8 | 0.045* |
| <i>Post-COVID Δ</i> | -0.1 | -5.5, 5.3 | 0.977 | 1.6 | -0.2, 3.4 | 0.078 | -1.7 | -5.6, 2.3 | 0.386 |
| <i>Pre- vs Post-</i> | -12.1 | -20.9, -3.4 | 0.009* | 1.8 | -1.0, 4.6 | 0.205 | -11.9 | -18.6, -5.3 | <0.001* |
| Ecuador | | | | | | | | | |
| <i>Baseline</i> | 20.9 | 13.8, 27.9 | <0.001* | 14.3 | 10.6, 18.1 | <0.001* | 6.6 | 4.5, 8.7 | <0.001* |
| <i>Pre-COVID Δ</i> | -0.04 | -0.87, 0.80 | 0.927 | 0.03 | -0.63, 0.68 | 0.929 | -0.02 | -0.30, 0.26 | 0.872 |
| <i>Immediate Δ</i> | -5.8 | -14.0, 2.3 | 0.154 | -4.3 | -11.3, 2.6 | 0.211 | -1.9 | -6.3, 2.5 | 0.391 |
| <i>Post-COVID Δ</i> | 0.26 | -0.28, 0.81 | 0.330 | 0.21 | -0.30, 0.69 | 0.385 | 0.03 | -0.37, 0.42 | 0.892 |
| <i>Pre- vs Post-</i> | 0.30 | -0.70, 1.30 | 0.541 | 0.18 | -0.73, 1.09 | 0.69 | 0.05 | -0.43, 0.53 | 0.838 |
| Nigeria | | | | | | | | | |
| <i>Baseline</i> | 13.4 | 7.9, 18.9 | <0.001* | 6.8 | 3.5, 10.1 | <0.001* | 7.6 | 4.8, 10.3 | <0.001* |
| <i>Pre-COVID Δ</i> | 1.6 | 0.7, 2.5 | 0.002* | 1.6 | 0.9, 2.3 | <0.001* | -0.04 | -0.4, 0.3 | 0.777 |
| <i>Immediate Δ</i> | -11.8 | -29.3, 5.8 | 0.179 | -14.1 | -28.6, 0.4 | 0.057 | 2.8 | -2.2, 7.7 | 0.258 |
| <i>Post-COVID Δ</i> | 1.3 | -0.6, 3.1 | 0.178 | 1.6 | -0.1, 3.2 | 0.070 | -0.4 | -0.7, -0.02 | 0.040* |
| <i>Pre- vs Post-</i> | -0.3 | -2.4, 1.8 | 0.739 | -0.1 | -1.9, 1.8 | 0.951 | -0.3 | -0.8, 0.2 | 0.18 |
| Zambia | | | | | | | | | |
| <i>Baseline</i> | 63.1 | 8.6, 117.5 | 0.025* | 58.4 | 6.5, 110.2 | 0.029* | 6.5 | 2.4, 10.6 | 0.004* |
| <i>Pre-COVID Δ</i> | 1.9 | -5.8, 9.6 | 0.61 | 2.0 | -5.4, 9.3 | 0.58 | -0.4 | -1.0, 0.3 | 0.233 |
| <i>Immediate Δ</i> | -18.5 | -52.9, 15.8 | 0.275 | -21.4 | -55.1, 12.4 | 0.202 | 4.3 | -1.9, 10.6 | 0.163 |
| <i>Post-COVID Δ</i> | -0.5 | -3.1, 2.1 | 0.705 | -0.2 | -2.8, 2.4 | 0.887 | -0.3 | -1.0, 0.4 | 0.340 |
| <i>Pre- vs Post-</i> | -2.4 | -10.5, 5.7 | 0.546 | -2.2 | -9.9, 5.6 | 0.569 | 0.1 | -0.9, 1.0 | 0.916 |