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# **BMJ Paediatrics Open**

## Cross-sectional study of paediatric case-mix presenting to an emergency centre during COVID-19

Journal:	BMJ Paediatrics Open
Manuscript ID	bmjpo-2020-000801
Article Type:	Original research
Date Submitted by the Author:	14-Jul-2020
Complete List of Authors:	Akuaake, Lembi; Stellenbosch University Faculty of Medicine and Health Sciences, Division of Emergency Medicine Hendrikse, Clint; University of Cape Town, Division of Emergency Medicine; Mitchells Plain Hospital and Heideveld Hospital, Emergency Centre Spittal, Graeme; Mitchells Plain Hospital, Paediatric Department Evans, Katya; Mitchells Plain Hospital and Heideveld Hospital, Emergency Centre; University of Cape Town, Division of Emergency Medicine van Hoving, Daniël; Stellenbosch University Faculty of Medicine and Health Sciences, Division of Emergency Medicine
Keywords:	Epidemiology, Health services research





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# Cross-sectional study of paediatric case-mix presenting to an emergency centre during COVID-19

<sup>1</sup>Lembi Magano Akuaake, <sup>2,3</sup>Clint Hendrikse, <sup>4</sup>Graeme Spittal, <sup>2,3</sup>Katya Evans, <sup>1</sup>Daniël Jacobus van Hoving

<sup>1</sup>Division of Emergency Medicine, Stellenbosch University, Cape Town, South Africa <sup>2</sup>Mitchells Plain Hospital and Heideveld Hospital Emergency Centres, Cape Town, South Africa <sup>3</sup>Division of Emergency Medicine, University of Cape Town, Cape Town, South Africa <sup>4</sup>Paediatric Department, Mitchells Plain Hospital, Cape Town, South Africa

Corresponding author: Daniël J. van Hoving

Division of Emergency Medicine, Stellenbosch University

PO Box 241

Cape Town, 8000

2.28 nvhoving@sun.ac.za

Number of tables: 4

Number of figures: 1

Word count: 2318

## ABSTRACT

## Objective

To describe and compare the effect of level 5 lockdown measures on the workload and case mix of paediatric patients presenting to a district-level emergency centre in Cape Town, South Africa.

## Methods

Paediatric patients (<13 years) presenting to Mitchells Plain Hospital were retrospectively analysed. The level 5 lockdown period (27/03/2020 - 30/04/2020) was compared to similar 5-week periods immediately before (21/02/2020 - 26/03/2020) and after the lockdown (01/05/2020 - 04/06/2020), and to similar time periods during 2018 and 2019. Patient demographics, characteristics, ICD-10 code diagnoses, disposition and process times were collected from an electronic patient tracking and registration database. The Chi-square test and the independent samples median test were used for comparisons.

## Results

Emergency centre visits during the lockdown period (n=592) decreased by 58% compared to 2019 (n=1413) and by 56% compared to the 2020 pre-lockdown period (n=1342). The proportion of under 1 year olds increased by 10.4% (p<0.001), with a 7.4% increase in self-referrals (p<0.001) and a 6.9% reduction in referrals from clinics (p<0.001). Proportionally more children were referred to inpatient disciplines (5.6%, p=0.001) and to a higher level of care (3.9%, p=0.004). Significant reductions occurred in respiratory diseases (66.9%, p<0.001), injuries (36.1%, p<0.001), and infectious diseases (34.1%, p<0.001). All process times were significantly different between the various study periods.

## Conclusion

Significantly less children presented to the emergency centre since the implementation of the COVID-19 lockdown, with marked reductions in respiratory and infectious-related diseases and in injuries.

## **KEYWORDS**

COVID-19, emergency centre, case mix, paediatric

## INTRODUCTION

Paediatric emergency care decreases childhood morbidity and mortality, but an epidemic has the potential to disrupt access to care and essential child health services.[1–3]

The corona virus disease (COVID-19) was declared a global pandemic by the World Health Organization (WHO) on 11 March 2020 and is caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).[4] The pandemic resulted in most countries implementing social distancing measures to curb the spread of the disease. The South African government implemented a national lockdown on 27 March 2020, consisting of five levels with stricter social distancing measures as levels increase.[5] The South African lockdown started at level 5 and lasted five weeks (27 March – 30 April 2020). This was followed by easing of social distancing measures during level 4 (1 May – 31 May 2020) and level 3 which started on 1 June 2020.

The implemented lockdown measures resulted in all non-urgent healthcare appointments being cancelled, including the de-escalation of services at community healthcare centres and the rescheduling of elective surgeries and outpatient department visits at hospital level. An upsurge in patients visiting the emergency centre was anticipated as most other healthcare services were de-escalated. Furthermore, the pandemic and subsequent lockdown periods coincided with autumn and the beginning of winter where an increase in respiratory-related cases are typically experienced, especially in the paediatric population.

Previous studies presented conflicting results of health care utilisation during an epidemic. An increase in paediatric patients presenting to emergency centres was seen during the swine flu (H1N1pdm09 virus) pandemic in 2009.[6–8] However, paediatric-related presentations decreased by up to 40% during the 2015 Middle East respiratory syndrome (MERS) epidemic in Korea.[9,10] A more pronounced decrease (80%) was witnessed during the 2003 Severe Acute Respiratory Syndrome (SARS) epidemic in Taiwan.[11] A decline in trauma cases presenting to emergency centres across South Africa has already been noticed,[12] but the effect of the national lockdown on paediatric presentations remains unclear. The aim of the study was to describe and compare the effect of the level 5 national COVID-19 lockdown measures on the workload and case mix of paediatric patients presenting to a district-level emergency centre in Cape Town, South Africa.

## METHODS

## Study design

A retrospective analysis of a prospectively collected observational database was conducted.

#### Study setting

Mitchells Plain Hospital is a 300-bed hospital providing district hospital health services to the surrounding community. It serves a low- to middle-income health district of approximately 600 000

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people.[13,14] The health district has many social challenges, including gangsterism, crime, and drug abuse. Interpersonal violence and other injuries are particularly prevalent during weekends.[15] Mitchells Plain Hospital is situated on the outskirts of Cape Town and has an emergency centre which manages around 4 100 patients per month; 950 being children under the age of 13 years. A quarter of the children are deemed very urgent or emergent at presentation (orange or red according to the South African Triage Scale)[16] and an average of 135 are admitted to the inpatient paediatric service. Monthly paediatric presentations increase to around 1 200 during the annual respiratory surge season (March – June), of which about 190 are admitted. Normally, the paediatric department assist with providing staff for the emergency centre and non-specialist physicians from the paediatric department have been the treating clinician for around 40% of acute paediatric presentations. Since the lockdown measures came in to effect, the paediatric department has been responsible for over 90% of acute paediatric presentations to free up emergency centre staff to assist with the adult workload. This was made possible by closing the paediatric out patient department and reverting to telephonic consultations that needed less staff.

An electronic patient tracking and registration database (HECTIS - Hospital and Emergency Centre Tracking Information System) is used to collect routine clinical data for each patient that is managed within the emergency centre. The tracking system was initially designed to track patients through the emergency centre. This allowed the streamlining of most patient processes and subsequently has been used to capture data related to process times, triage scores, ICD-10 code diagnoses and dispositions. The database has been built on an Oracle platform and is stored off-site. Data are automatically backed up everyday. The database is access controlled and authorised users are granted access and authorisation according to their specific clinical role. A triage nurse will thus have access to different parts of the database than a clinician in the emergency centre.

## **Study participants**

Convenience sampling was used to include all patients <13 years of age that presented to the emergency centre of Mitchells Plain Hospital over the study periods. Time periods included the level 5 lockdown period (27 March 2020 till 30 April 2020), a 5-week period immediately before the lockdown (21 February 2020 – 26 March 2020), a 5-week period immediately after the lockdown (01 May 2020 – 04 June 2020) and corresponding periods during 2018 and 2019.

## Data collection and management

Data were exported from the HECTIS database for the various study periods. Variables included age, gender, mode of transport, type of presentation, patient acuity, ICD-10 code diagnosis, process times, and disposition. Patient acuity was determined at arrival to the hospital and patients were categorised into emergency (red), very urgent (orange), urgent (yellow), and non-urgent (green) as stipulated by the South African Triage Scale (SATS).[16] Patients' diagnosis was determined from ICD-10 codes (International Statistical Classification of Diseases and Related Health Problems, 10th revision)

documented as the main diagnosis. Patient process times were calculated from electronic timestamps and included time to triage (arrival at emergency centre to time of triage), time to consultation (arrival at emergency centre to time seen by physician), time to disposition (arrival at emergency centre to time when emergency centre disposition was decided) and time in emergency centre (arrival at emergency centre to time when patient left the emergency centre). Process times of patients that absconded were only included to calculate the time to triage (if a triage time was documented) and were excluded from the other process times.

## Statistical analysis

Summary statistics were used to describe all variables. Categorical data are summarised using frequency counts and percentages, and distributions of variables are presented as two-way tables or bar charts. Median was used as the measure of central tendency for continuous responses and quartiles as indicators of spread. The relationship between categorical variables was determined with the Chi-square test or the Fisher's Exact test, and process times were compared with the independent samples median test. A 5% significance level was used and data were analysed using SPSS Statistics for Windows, Version 26.0 (IBM Corp. Released 2019. Armonk, NY: IBM Corp.).

## **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.

## RESULTS

#### **Overall emergency centre visits**

A total of 39 905 emergency centre visits were documented over the study periods, of which 9 983 were younger than 13 years of age. One patient was excluded as the visit only pertained to special investigations; 9 982 were thus analysed. There were 2 464 paediatric emergency centre visits during the 2020 time periods, 1 601 less than in 2019 (n=4065) and 989 less than in 2018 (n=3453). There was a 6.2% (n=78) increase in the number of patients seen during the 2020 pre-lockdown period compared to 2019, followed by a 58.1 % (n=821) reduction for the level 5 lockdown periods and a 61.8% (n=858) reduction over the post-lockdown periods (Figure 1).

#### **Demographics and characteristics**

The demographics and characteristics of patients are presented in Table 1. Significant differences during level 5 lockdown compared to the 2020 pre-lockdown period were seen in patient's age, where patients were coming from, patient acuity and disposition. The proportion of children younger than 1 year increased by 10.4% (p<0.001), with a decrease in the 1 to 5 year group (5.6%, p=0.022) and in patients

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over the age of 5 years (4.8%, p=0.02). The proportions in the age category changed as lockdown measures were eased; children over 5 years were the only group showing an increase (7.1%, p=0.005). An increase in self referrals occurred (7.4%, p<0.001), with a subsequent decrease in referrals from primary healthcare clinics (6.9%, p<0.001) and general practitioners (0.4%, p=0.754). Children presenting during the level 5 lockdown periods were also sicker with a 2% increase in emergency (triaged red) cases (p=0.018). The change in patient acuity was also evident in the change in patient disposition; a proportional increase occurred in patients being referred to the inpatient disciplines (5.6%, p=0.001) and patients referred for higher level of care (3.9%, p=0.004). This coincided with a decrease being dischargee ... in patients being discharged home from the emergency centre (5.6%, p=0.019).

Table 1. Demographics and characteristics of paediatric patients presenting to the emergency centre during the level 5 COVID-19 lockdown period and corresponding 5-week periods immediately before and after the lockdown and for two previous years.

			2018			2019			2020	
Variable s n (%)		Pre- lockdown	Level 5 lockdown	Post- lockdown	Pre- lockdown	Level 5 lockdown	Post- lockdown	Pre- lockdown	Level 5 lockdown	Post- lockdown
Age (year)	<1	210 (21.2%)	372 (31.4%)	368 (28.8%)	249 (19.7%)	351 (24.8%)	312 (22.5%)	243 (18.1%)	169 (28.5%)ª	116 (21.9%) <sup>b</sup>
	1-5	528 (53.2%)	592 (50%)	677 (53%)	717 (56.7%)	766 (54.2%)	742 (53.5%)	787 (58.6%)	314 (53%)ª	279 (52.6%)
	>5	254 (25.6%)	219 (18.5%)	233 (18.2%)	298 (23.6%)	296 (20.9%)	334 (24.1%)	312 (23.2%)	109 (18.4%)ª	135 (25.5%) <sup>b</sup>
Gender	Female	436 (44%)	509 (43%)	588 (46%)	537 (42.5%)	609 (43.1%)	610 (43.9%)	565 (42.1%)	267 (45.1%)	251 (47.4%)
	Male	556 (56%)	674 (57%)	690 (54%)	727 (57.5%)	804 (56.9%)	778 (56.1%)	777 (57.9%)	325 (54.9%)	279 (52.6%)
Transpor t method	Self	785 (79.1%)	920 (77.8%)	1082 (84.7%)	1025 (81.1%)	1171 (82.9%)	1267 (91.3%)	1115 (83.1%)	489 (82.6%)	476 (89.8%) <sup>b</sup>
emethod	Ambulan ce	130 (13.1%)	178 (15%)	193 (15.1%)	152 (12%)	133 (9.4%)	120 (8.6%)	145 (10.8%)	69 (11.7%)	52 (9.8%)
	Police or Fire service	2 (0.2%)	1 (0.1%)	1 (0.1%)	2 (0.2%)	4 (0.3%)	1 (0.1%)	0 (0%)	0 (0%)	0 (0%)
	Unknown	75 (7.6%)	84 (7.1%)	2 (0.2%)	85 (6.7%)	105 (7.4%)	0 (0%)	82 (6.1%)	34 (5.7%)	2 (0.4%) <sup>b</sup>
Arrival from	Scene / home	658 (66.3%)	835 (70.6%)	907 (71%)	931 (73.7%)	1069 (75.7%)	1067 (76.9%)	1000 (74.5%)	485 (81.9%) <sup>a,c</sup>	457 (86.2%) <sup>d</sup>
	Other healthcar e facility	262 (26.4%)	266 (22.5%)	285 (22.3%)	250 (19.8%)	242 (17.1%)	220 (15.9%)	260 (19.4%)	74 (12.5%) <sup>a,c</sup>	52 (9.8%) <sup>d</sup>
	General Practition er	72 (7.3%)	82 (6.9%)	86 (6.7%)	83 (6.6%)	99 (7%)	101 (7.3%)	81 (6%)	33 (5.6%)	21 (4%) <sup>d</sup>
	Unknown	0 (0%)	0 (0%)	0 (0%)	0 (0%)	3 (0.2%)	0 (0%)	1 (0.1%)	0 (0%)	0 (0%)
Triage category	Non- urgent (Green)	238 (24%)	202 (17.1%)	202 (15.8%)	311 (24.6%)	287 (20.3%)	241 (17.4%)	344 (25.6%)	142 (24%)	172 (32.5%) <sup>b,d</sup>
	Urgent (Yellow)	516 (52%)	622 (52.6%)	760 (59.5%)	639 (50.6%)	758 (53.6%)	733 (52.8%)	663 (49.4%)	300 (50.7%)	256 (48.3%)
	Very urgent (Orange)	181 (18.2%)	286 (24.2%)	255 (20%)	246 (19.5%)	294 (20.8%)	351 (25.3%)	267 (19.9%)	115 (19.4%)	78 (14.7%) <sup>b,d</sup>
	Emergen cy (Red)	33 (3.3%)	41 (3.5%)	35 (2.7%)	39 (3.1%)	40 (2.8%)	35 (2.5%)	30 (2.2%)	25 (4.2%)ª	17 (3.2%)
	Unknown	24 (2.4%)	32 (2.7%)	26 (2%)	29 (2.3%)	34 (2.4%)	28 (2%)	38 (2.8%)	10 (1.7%)	7 (1.3%)
Dispositi on	Death	2 (0.2%)	0 (0%)	1 (0.1%)	1 (0.1%)	4 (0.3%)	3 (0.2%)	4 (0.3%)	4 (0.7%)	0 (0%)
	Referred to in- hospital discipline s	193 (19.5%)	251 (21.2%)	293 (22.9%)	210 (16.6%)	209 (14.8%)	159 (11.5%)	163 (12.1%) <sup>e</sup>	105 (17.7%) <sup>a</sup>	91 (17.2%) <sup>d</sup>
	Discharge d	674 (67.9%)	770 (65.1%)	817 (63.9%)	862 (68.2%)	946 (66.9%)	983 (70.8%)	871 (64.9%)	351 (59.3%) <sup>a,c</sup>	346 (65.3%) <sup>b,d</sup>
	Absconde d	28 (2.8%)	42 (3.6%)	58 (4.5%)	66 (5.2%)	99 (7%)	92 (6.6%)	160 (11.9%) <sup>e</sup>	33 (5.6%)ª	13 (2.5%) <sup>b,d</sup>
	Transferr ed to higher level facility	58 (5.8%)	86 (7.3%)	62 (4.9%)	101 (8%)	90 (6.4%)	87 (6.3%)	92 (6.9%)	64 (10.8%) <sup>a,c</sup>	65 (12.3%) <sup>d</sup>
	Refer to other	37 (3.7%)	34 (2.9%)	47 (3.7%)	24 (1.9%)	65 (4.6%)	64 (4.6%)	52 (3.9%) <sup>e</sup>	35 (5.9%)	15 (2.8%) <sup>b</sup>

<sup>a</sup> Statistically significant difference (p<0.05) between pre-lockdown period 2020 and level 5 lockdown period 2020 (see supplementary table 1)

<sup>b</sup> Statistically significant difference (p<0.05) between level 5 lockdown period 2020 and post-lockdown period 2020 (see supplementary table 1)

<sup>c</sup> Statistically significant difference (p<0.05) between level 5 lockdown period 2019 and 2020 (see supplementary table 1)

<sup>d</sup> Statistically significant difference (p<0.05) between post-lockdown period 2019 and 2020 (see supplementary table 1)

<sup>e</sup> Statistically significant difference (p<0.05) between pre-lockdown period 2019 and 2020 (see supplementary table 1)

Pre-lockdown period: 21 February – 26 March; Lockdown period: 27 March – 30 April; Post-lockdown period: 01 May – 04 June

## **Diagnostic categories**

The top three diagnostic categories during the level 5 lockdown were related to the respiratory system (n=141, 23.8%), injuries and poisonings (n=133, 22.5%), and infectious diseases (n=110, 18.6%). In the different age groups, infectious diseases were most frequent in the under 1 year group (n=52, 30.8%), respiratory-related diseases in the 1-5 year group (n=84, 26.8%), and injury-related presentations in the over 5 year group (n=46, 14.6%) (Table 2). The top five diagnostic categories per age group and per time period is presented in Supplementary table 2. Presentations during the level 5 lockdown decreased in all the diagnostic categories compared to the 2020 pre-lockdown period (Table 3). Significant reductions occurred in respiratory diseases (n=285, 66.9%, p<0.001), injuries (n=75, 36.1%, p<0.001), and infectious and parasitic diseases (n=57, 34.1%, p<0.001). Proportionally, diseases of the respiratory system decreased by 7.9%, infectious-related diseases increased by 6.2%, and injuries increased by 7.0% (Table 3) (see supplementary table 3 for the diagnostic categories for all the time periods).

Table 2. Top five diagnostic categories per age group presenting to the emergency centre during the level 5 COVID-19 lockdown period.

	All			<1 year 📃			1-5 year			> 5 year	
Rank	ICD-10 Category	N (%)	Rank	ICD-10 Category	n (%)	Rank	ICD-10 Category	n (%)	Rank	ICD-10 Category	n (%)
1	Respiratory system	141 (23.8)	1	Infectious diseases	52 (30.8)	1	Respirator y system	84 (26.8)	1	Injury and poisoning	46 (14.6)
2	Injury and poisoning	133 (22.5)	2	Respiratory system	43 (25.4)	2	Injury and poisoning	79 (25.2)	2	Respirator y system	14 (4.5)
3	Infectious diseases	110 (18.6)	3	Findings, not elsewhere classified	13 (7.7)	3	Infectious diseases	47 (15.0)	3	Infectious diseases	11 (3.5)
4	Nervous system	30 (5.1)	4	Skin and subcutaneous tissue	11 (6.5)	4	Nervous system	16 (5.1)	4	Nervous system	10 (3.2)
5	Skin and subcutaneou s tissue	26 (4.4)	5	Injury and poisoning	8 (4.7)	5	Ear and mastoid process	14 (4.5)	5	Digestive system	5 (1.6)

ICD-10: International Statistical Classification of Diseases and Related Health Problems, 10th revision

					2020 vs 2019						Septemt	202	:0		
		Pre-lockdow	'n	I	evel 5 lockdowr	ı	Р	ost-lockdown		Pre-lockdov	wn vs Level 5 loc	kdown	Level 5	lockdown vs Po lockdown	ost-
CD-10 category	Actual n (%)	Proportiona I	p	Actual n (%)	Proportiona I	р	Actual n (%)	Proportiona I	р	Actual n (%)	Propertiona 그	р	Actual n (%)	Proportiona I	р
Certain infectious and parasitic liseases	-80 (- 32.4)	-7.1%	<0.001	-118 (- 51.8)	2.5%	0.191	-97 (-58.1)	1.2%	0.486	-57 (-34.1)	0 6.2% Ownloa	<0.001	-40 (-36.4)	-5.4%	0.01
/I Diseases of the nervous system	-7 (- 14.3)	-0.8%	0.337	-14 (- 31.8)	2.0%	0.038	-23 (-59.0)	0.2%	0.878	-12 (-28.6)	G 2.0%	0.050	-14 (-46.7)	-2.1%	0.097
/III Diseases of the ear and mastoid process	22 (51.2)	1.4%	0.076	-42 (- 65.6)	-0.8%	0.469	-50 (-78.1)	-2.0%	0.053	-43 (-66.2)	fr-1.1%	0.287	-8 (-36.4)	-1.1%	0.316
CDiseases of the respiratory system	-16 (- 3.6)	-3.3%	0.081	-411 (- 74,5)	-15.3%	<0.001	-466 (-77.7)	-17.9%	<0.001	-285 (-66.9)	<b>P:</b> -7.9%	<0.001	-7 (-5.0)	1.5%	0.579
(I Diseases of the ligestive system	2 (7.7)	0.0%	1.000	-18 (- 62.1)	-0.2%	0.862	1 (4.3)	2.8%	0.000	-17 (-60.7)	<u>n</u> . pa-0.2%	0.861	13 (118.2)	2.6%	0.015
(II Diseases of the kin and subcutaneous tissue	1 (2.1)	-0.1%	0.819	-20 (- 43.5)	1.1%	0.236	-12 (-33.3)	1.9%	0.039	-23 (-46.9)	с. с. оре еп	0.445	-2 (-7.7)	0.1%	1.000
KIV Diseases of the genitourinary system	22 (122.2)	1.6%	0.008	-13 (- 48.5)	0.5%	0.604	-10 (-45.5)	0.7%	0.334	-26 (-65.0)	b-0.6% J.	0.462	-2 (-14.3)	-0.1%	1.000
VIII Symptoms, igns and abnormal linical and aboratory findings, not elsewhere classified	38 (74.5)	2.6%	0.004	-45 (- 64.3)	-0.8%	0.493	-42 (-57.5)	0.5%	0.652	-64 (-71.9)	-2.4% on April 19	0.046	6 (24.0)	1.6%	0.220
(IX Injury, poisoning and certain other consequences of external causes	-1 (- 0.5)	-1.0%	0.487	-12 (- 8.3)	12.2%	<0.001	-21 (-12.1)	16.4%	<0.001	-75 (-36.1)	7.0% 2024 by guest. Protected by copyright.	<0.001	20 (15.0)	6.4%	0.016

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#### Process times

All process times were significantly different between the various study periods (Table 4). Comparing median times between the level 5 lockdown period and the 2020 pre-lockdown period, time to triage decreased by 7 minutes (p<0.001), time to consultation by 91 minutes (p<0.001), time to deciding disposition by 76 minutes (p<0.001), and length of stay within the emergency centre by 41 minutes (p=0.003).

Table 4. Process times for paediatric patients (n=9308) presenting to the emergency centre during the 5-week COVID-19 level 5 lockdown period and corresponding periods for three years prior to the lockdown.

		2018			2019			2020		р
Process times (minutes), median(Q1-Q3) [maximum]	Pre-lockdown	Level 5 lockdown	Post- lockd own	Pre-lockdown	Level 5 lockdown	Post- lockd own	Pre-lockdown	Level 5 lockdown	Post- lockd own	
Time to triage	12 (5-31) [581]	15 (4-39) [803]	20 (7- 47) [460]	19 (6-47) [612]	22 (7-52) [565]	16 (5- 43) [368]	19 (6-49) [665]	12 (4-33) [308]	14 (5- 34) [1461]	<0.0 01
Time to consultation	81 (45-132) [1067]	95 (54-159) [905]	104 (59- 171) [1222]	107 (61-187) [654]	119 (66-214) [742]	118 (65- 208) [685]	140 (71-235) [872]	49 (42-122) [590]	59 (29- 101) [1054]	<0.0 01
Time to disposition decision	146 (94-216) [1437]	157 (99-242) [1146]	160 (106- 246) [1291]	190 (121-295) [1521]	193 (121-314) [1506]	191 (112- 291) [1026]	245 (156-365) [3337]	169 (95-267) [1918]	123 (70- 204) [1773]	<0.0 01
Time in emergency centre	188 (126-278) [1438]	205 (129-320) [1797]	207 (130- 330) [3800]	274 (165-495) [2043]	262 (146-428) [1717]	251 (142- 411) [2632]	311 (200-492) [3353]	270 (153-459) [2349]	164 (85- 423) [1984]	<0.0 01

Q1-Q3: 25th to 75th percentile

Pre-lockdown period: 21 February – 26 March; Lockdown period: 27 March – 30 April; Post-lockdown period: 01 May – 04 June Tel.

## DISCUSSION

The volume of children visiting the emergency centre during and after the level 5 lockdown period was significantly lower than similar previous time periods. Significant reductions of total numbers were seen in respiratory diseases, infectious diseases and injuries (Table 3). Proportional reductions of diseases related to the respiratory system occurred in all age groups, while infectious diseases increased in younger patients (<1 year) and injuries increased in children older than one year.

The overall reduction in paediatric emergency centre visits is similar to experiences from the SARS and MERS pandemics, as people tend to avoid or delay attending hospitals due to the fear of contracting the communicable disease.[9–11] Anecdotal evidence do suggest that attendance to the primary healthcare services also decreased. This is of concern and child health needs to be monitored closely over the coming 12 months. The likely reduction in immunisations, specifically measles, could result in outbreaks of non-COVID-19 communicable diseases causing more morbidity and mortality.[3] The impact of this would be substantially worse in impoverished communities.

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The reduction in respiratory and infectious-related diseases were substantial contributors to the overall reduction in emergency centre attendance, although the proportion of children with infectious diseases increased. These reductions are most likely multifactorial, and one important consideration could be the closing of early childhood development centres. It has been well documented that children attending crèches have a higher incidence of infectious diseases, including respiratory tract infections.[17,18] About three quarters of paediatric emergency centre attendees at Mitchells Plain Hospital are children under the age of 5 years, of whom a large proportion will normally be in formal or informal crèches while their parents work. The lockdown measures forced most parents to stay at home, thereby further reducing children's exposure to infections (COVID-19 and other) as trips to shops or work were limited.

Children presenting with injuries and poisoning decreased by a third during the level 5 lockdown period, but increased proportionally by 7% (Table 3). This was not expected and could be from children bypassing the community healthcare centres; thus children with minor injuries also presented to the hospital. On the other hand, the home is one of the most dangerous places for children. It is estimated that around 90% of unintentional injuries in young children occur in or around their home when they are supposedly being supervised by a caregiver.[19] Injury risk could also have increased if children became bored at home, while parents were most likely frustrated in the constant supervision of the children. Furthermore, anecdotal evidence suggest that the number of child abuse cases did not decrease during the lockdown periods and remain on a similar trend than before.[20] Another possible reason is the longstanding problem in South Africa where many children are looking after themselves and other children, with an understandable lack of adequate supervision.

The main strength of the study is the use of a comprehensive database that is completed in real time. Although data are not cross-checked, we expect the data to be adequately reflecting the truth. However, care should be taken to generalise the results of the study to other healthcare facilities as it reflects a single centre in a fairly distinctive setting. Diseases were categorised according to diagnostic codes (ICD-10) assigned by attending physicians. A diagnostic code was not assigned to around 10% of patients. We also did not validate whether the correct diagnosis were made, neither did we attempt to ensure that the correct diagnostic code were assigned to the diagnosis. This could have resulted in non-systematic error.

## CONCLUSION

Significantly less children presented to the emergency centre since the implementation of national COVID-19 level 5 lockdown. The closure of early childhood development centres and schools, together with the restriction of movement of children and their caregivers, markedly reduced the infectious and respiratory-related component of paediatric attendees. The burden of injuries remains a huge problem in resource-limited societies, with the home being a high-risk area for unintentional injuries.

## CONTRIBUTIONS

DJvH and CH conceived the study. MA, CH, and KE undertook data collection. MA and DJvH cleaned the data, and DJvH and CH did the data analyses. MA drafted the manuscript and the remaining authors critiqued the paper for important intellectual content. All authors read and approved the final version of the manuscript. MA is the guarantor.

## FUNDING

The study was self-funded.

## **COMPETING INTERESTS**

None declared.

## ETHICS APPROVAL

The study was approved by the Health Research Ethics Committee of Stellenbosch University (Ref: N20/04/009\_COVID-19) and included a waiver of informed consent.

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## WHAT IS ALREADY KNOWN ON THIS TOPIC

- \_ The volume of children attending emergency centres varied during previous epidemics
- Paediatric emergency centre attendances decreased during COVID-19 \_

## WHAT THIS STUDY ADDS

- <text><text><text><text> -

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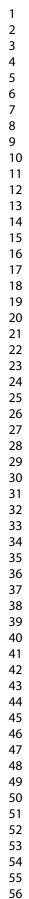
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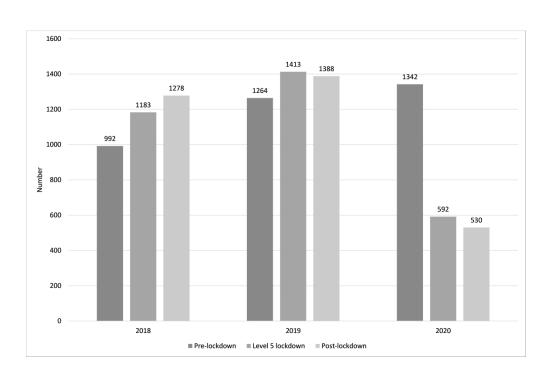
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			2020 vs 2	2019				202	0
	Pre-lockd	own	Level 5 lock	down	Post-lock	down	Pre-lockdown lockdov		Level 5 le Post-le
Variables n (%)	n (%)	р	n (%)	р	n (%)	р	n (%)	р	n (%)
Age (year)									
<1	-6 (-2.4)	0.317	-182 (-51.9)	0.094	-196 (-62.8)	0.806	-74 (-30.5)	<0.001	-53 (-31.4
1-5	70 (9.7)	0.322	-452 (-59.0)	0.659	-463 (-62.4)	0.759	-473 (-60.1)	0.022	-35 (-11.1
>5	14 (4.)	0.853	-187 (-63.2)	0.201	-199 (-59.6)	0.553	-203 (-65.1)	0.020	26 (23.9
Gender									
Female	28 (5.2)	0.874	-342 (-56.2)	0.430	-359 (-58.9)	0.182	-298 (-52.7)	0.232	-16 (-6.0
Male	50 (6.9)	0.000	-479 (-59.6)		-499 (-64.1)	0.000	-452 (-58.2)	0.000	-46 (-14.2
Transport method	1								
Self	90 (8.8)	0.201	-682 (-58.2)	0.897	-791 (-62.4)	0.330	-626 (-56.1)	0.844	-13 (-2.7
Ambulance	-7 (-4.6)	0.355	-64 (-48.1)	0.143	-68 (-56.7)	0.475	-76 (-52.4)	0.637	-17 (-24.6
Police or Fire serv	ice -2 (-100)	0.235	-4 (-100)	0.326	-1 (-100)	1.000	0 (0)		0 (0
Unknown	-3 (-3.5)	0.575	-71 (-67.6)	0.179	2 (200)	0.076	-48 (-58.5)	0.758	-32 (-94.1
Arrival from									
Scene / home	69 (7.4)	0.623	-584 (-54.6)	0.002	-610 (-57.2)	<0.001	-515 (-51.5)	<0.001	-28 (-5.8
Other healthcare									

	Pre-lockdo	own	Level 5 lock	down	Post-lock	down	Pre-lockdown lockdov		Level 5 lock Post-lock	
Variables n (%)	n (%)	р	n (%)	р	n (%)	р	n (%)	р	n (%)	р
Age (year)										
<1	-6 (-2.4)	0.317	-182 (-51.9)	0.094	-196 (-62.8)	0.806	-74 (-30.5)	<0.001	-53 (-31.4)	0.011
1-5	70 (9.7)	0.322	-452 (-59.0)	0.659	-463 (-62.4)	0.759	-473 (-60.1)	0.022	-35 (-11.1)	0.905
>5	14 (4.)	0.853	-187 (-63.2)	0.201	-199 (-59.6)	0.553	-203 (-65.1)	0.020	26 (23.9)	0.005
Gender							,			
Female	28 (5.2)	0.874	-342 (-56.2)	0.430	-359 (-58.9)	0.182	-298 (-52.7)	0.232	-16 (-6.0)	0.472
Male	50 (6.9)	0.000	-479 (-59.6)		-499 (-64.1)	0.000	-452 (-58.2)	0.000	-46 (-14.2)	0.000
Transport method										
Self	90 (8.8)	0.201	-682 (-58.2)	0.897	-791 (-62.4)	0.330	-626 (-56.1)	0.844	-13 (-2.7)	0.001
Ambulance	-7 (-4.6)	0.355	-64 (-48.1)	0.143	-68 (-56.7)	0.475	-76 (-52.4)	0.637	-17 (-24.6)	0.336
Police or Fire service	-2 (-100)	0.235	-4 (-100)	0.326	-1 (-100)	1.000	0 (0)		0 (0)	
Unknown	-3 (-3.5)	0.575	-71 (-67.6)	0.179	2 (200)	0.076	-48 (-58.5)	0.758	-32 (-94.1)	<0.001
Arrival from										
Scene / home	69 (7.4)	0.623	-584 (-54.6)	0.002	-610 (-57.2)	<0.001	-515 (-51.5)	<0.001	-28 (-5.8)	0.051
Other healthcare facility	10 (4)	0.805	-168 (-69.4)	0.011	-168 (-76.4)	0.001	-186 (-71.5)	<0.001	-22 (-29.7)	0.157
General Practitioner	-2 (-2.4)	0.628	-66 (-66.7)	0.277	-80 (-79.2)	0.009	-48 (-59.3)	0.754	-12 (-36.4)	0.213
Unknown	1 (100)	1.000	-3 (-100)	0.560	0 (0)		-1 (-100)	1.000	0 (0)	
Triage category										
Non-urgent (Green)	33 (10.6)	0.557	-145 (-50.5)	0.073	-69 (-28.6)	<0.001	-202 (-58.2)	0.460	-30 (-14.2)	0.002
Urgent (Yellow)	24 (3.7)	0.292	-458 (-60.4)	0.239	-477 (-65.1)	0.082	-363 (-58.7)	0.622	-44 (-21.1)	0.437
Very urgent (Orange)	21 (8.5)	0.805	-179 (-60.9)	0.504	-273 (-77.8)	<0.001	-152 (-54.8)	0.853	-37 (-14.7)	0.039
Emergency (Red)	-9 (-23.1)	0.182	-15 (-37.5)	0.128	-18 (-51.4)	0.432	-5 (-56.9)	0.018	-8 (-32.2)	0.432
Unknown	9 (31.0)	0.458	-24 (-70.6)	0.404	-21 (-75)	0.347	-28 (-73.7)	0.155	-3 (-30)	0.636
Disposition	5 (51.0)	0.450	24(70.0)	0.404	21(73)	0.347	20(73.7)	0.135	5 ( 30)	0.030
Referred to in-										
hospital disciplines Discharged	3 (300)	0.376	0 (0)	0.246	-3 (-100)	0.565	0 (0)	0.258	-4 (-100)	0.127
Absconded	-47 (-22.4)	0.001	-104 (-49.8)	0.106	-68 (-42.8)	0.001	-58 (-35.6)	0.001	-14 (-13.3)	0.814
	9 (1.0)	0.081	-595 (-62.9)	0.001	-637 (-64.8)	0.020	-520 (-59.7)	0.019	-5 (-1.4)	0.042
Transferred to higher level facility	94 (142.4)	0.001	-66 (-66.7)	0.277	-79 (-85.9)	0.001	-127 (-79.4)	0.001	-20 (-60.6)	0.010
Refer to other	-9 (-8.9)	0.295	-26 (-28.9)	0.001	-22 (-25.3)	<0.001	-28 (-30.4)	0.004	1 (1.6)	0.455
Referred to in- hospital disciplines	28 (116.7)	0.003	-30 (-46. 2)	0.260	-49 (-76.6)	0.094	-17 (-32.7)	0.056	-20 (-57.1)	0.014

Pre-lockdown period: 21 February – 26 March; Lockdown period: 27 March – 30 April; Post-lockdown period: 01 May – 04 June

Supplementary table 2. Top five diagnostic categories per age group presenting to the emergency centre during the level 5 COVID-19 lockdown period and similar time periods.

2019 Lockdowr	ו	2020 Pre-lockdov	vn	2020 level 5 lockd	own	2020 Post-lockdo	wn
ICD-10 Category	n (%)	ICD-10 Category	n (%)	ICD-10 Category	n (%)	ICD-10 Category	n (%)
All							
Respiratory system	442	Respiratory system	426	Respiratory system	141	Injury and poisoning	153
	(35.0)		(31.7)		(23.8)		(28.9
Infectious diseases	247	Injury and poisoning	208	Injury and poisoning	133	Respiratory system	134
	(19.5)		(15.5)		(22.5)		(25.3
Injury and poisoning	209	Infectious diseases	167	Infectious diseases	110	Infectious diseases	7
	(16.5)		(12.4)		(18.6)		(13.2
Findings, not	51	Findings, not	89	Nervous system	30	Findings, not	3
elsewhere classified	(4.0)	elsewhere classified	(6.6)		(5.1)	elsewhere classified	(5.8
Nervous system	49	Ear and mastoid	65	Skin and	26	Digestive system	2
	(3.9)	process	(4.8)	subcutaneous tissue	(4.4)		(4.5
						Skin and	(4.5
<1 year						subcutaneous tissue	(4.3
Respiratory system	200	Respiratory system	78	Infectious diseases	52	Infectious diseases	3
nespiratory system	(57.0)	Respiratory system	(32.1)		(30.8)		(28.4
Infectious diseases	65	Infectious diseases	61	Respiratory system	43	Respiratory system	2
	(18.5)		(25.1)		(25.4)		(25.0
Findings, not	11	Findings, not	20	Findings, not	13	Injury and poisoning	1
elsewhere classified	(3.1)	elsewhere classified	(8.2)	elsewhere classified	(7.7)		(11.2
Injury and poisoning	10	Injury and poisoning	18	Skin and	11	Skin and	9 (7.8
	(2.8)		(7.4)	subcutaneous tissue	(6.5)	subcutaneous tissue	
Skin and	7 (2.0)	Skin and	10	Injury and poisoning	8 (4.7)	Digestive system	6 (5.2
subcutaneous tissue		subcutaneous tissue	(4.1)				
Ear and mastoid	7 (2.0)						
process							
1-5 year							
Respiratory system	294	Respiratory system	284	Respiratory system	84	Injury and poisoning	9
	(38.4)		(36.1)		(26.8)		(33.3
Infectious diseases	125	Injury and poisoning	108	Injury and poisoning	79	Respiratory system	7
	(16.3)		(13.7)		(25.2)		(28.3
Injury and poisoning	78	Infectious diseases	91	Infectious diseases	47	Infectious diseases	2
	(10.2)		(11.6)		(15.0)		(8.2
Ear and mastoid	50	Ear and mastoid	51	Nervous system	16	Findings, not	2
process	(6.5)	process	(6.5)		(5.1)	elsewhere classified	(7.2
Findings, not	32	Findings, not	36	Ear and mastoid	14	Ear and mastoid	1
elsewhere classified	(4.2)	elsewhere classified	(4.6)	process	(4.5)	process	(4.3
> 5 year							
Respiratory system	58	Injury and poisoning	82	Injury and poisoning	46	Injury and poisoning	4
	(7.6)		(10.4)	· · · · · · · · · · · · · · · · · · ·	(14.6)		(16.8
Injury and poisoning	57	Respiratory system	64	Respiratory system	14	Respiratory system	2
	(7.4)		(8.1)		(4.5)		(9.3
Infectious diseases	38	Findings, not	33	Infectious diseases	11	Infectious diseases	
	(5.0)	elsewhere classified	(4.2)	Namana a stars	(3.5)	Dissettive en et e u	(5.0
Findings, not	27	Nervous system	19	Nervous system	10	Digestive system	1
elsewhere classified	(3.5)		(2.4)	Disections a start	(3.2)	New your of the set	(4.3
Nervous system	24	Skin and	16	Digestive system	5 (1.6)	Nervous system	7 (2.5
	(3.1)	subcutaneous tissue	(2.0)				
		Genitourinary system	16		1		1

ICD-10: International Statistical Classification of Diseases and Related Health Problems, 10th revision; Pre-lockdown period: 21 February – 26 March; Lockdown period: 27 March – 30 April; Post-lockdown period: 01 May – 04 June

Supplementary table 3. Diagnostic categories of paediatric patients presenting to the emergency centre during the level 5 COVID-19 lockdown period and corresponding time periods.

		2018			2019			2020	
ICD-10 Category, n(%)	Pre- lockdo wn	Level 5 lockdown	Post- lockdo wn	Pre- lockdo wn	Level 5 lockdown	Post- lockdo wn	Pre- lockdo wn	Level 5 lockdown	Post- lockdo wn
I Certain infectious and parasitic diseases	220 (22.2%)	207 (17.5%)	225 (17.6%)	247 (19.5%)	228 (16.1%)	167 (12%)	167 (12.4%)	110 (18.6%)	7 (13.2%
II Neoplasms	1 (0.1%)	2 (0.2%)	0 (0%)	0 (0%)	3 (0.2%)	2 (0.1%)	0 (0%)	0 (0%)	0 (0%
III Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	0 (0%)	0 (0%)	1 (0.1%)	2 (0.2%)	1 (0.1%)	0 (0%)	1 (0.1%)	1 (0.2%)	3 (0.6%
IV Endocrine, nutritional and metabolic diseases	1 (0.1%)	1 (0.1%)	7 (0.5%)	8 (0.6%)	7 (0.5%)	8 (0.6%)	2 (0.1%)	1 (0.2%)	2 (0.4%
V Mental and behavioural disorders	1 (0.1%)	3 (0.3%)	3 (0.2%)	2 (0.2%)	0 (0%)	6 (0.4%)	0 (0%)	2 (0.3%)	0 (0%
VI Diseases of the nervous system	21 (2.1%)	16 (1.4%)	24 (1.9%)	49 (3.9%)	44 (3.1%)	39 (2.8%)	42 (3.1%)	30 (5.1%)	16 (39
VII Diseases of the eye and adnexa	6 (0.6%)	4 (0.3%)	8 (0.6%)	10 (0.8%)	11 (0.8%)	14 (1%)	9 (0.7%)	2 (0.3%)	1 (0.29
VIII Diseases of the ear and mastoid process	25 (2.5%)	45 (3.8%)	66 (5.2%)	43 (3.4%)	64 (4.5%)	64 (4.6%)	65 (4.8%)	22 (3.7%)	(2.69
IX Diseases of the circulatory system	0 (0%)	0 (0%)	2 (0.2%)	3 (0.2%)	6 (0.4%)	2 (0.1%)	1 (0.1%)	1 (0.2%)	0 (09
X Diseases of the respiratory system	308 (31%)	500 (42.3%)	512 (40.1%)	442 (35%)	552 (39.1%)	600 (43.2%)	426 (31.7%)	141 (23.8%)	13 (25.39
XI Diseases of the digestive system	34 (3.4%)	30 (2.5%)	27 (2.1%)	26 (2.1%)	29 (2.1%)	23 (1.7%)	28 (2.1%)	11 (1.9%)	(4.59
XII Diseases of the skin and subcutaneous tissue	82 (8.3%)	59 (5%)	50 (3.9%)	48 (3.8%)	46 (3.3%)	36 (2.6%)	49 (3.7%)	26 (4.4%)	(4.59
XII Diseases of the musculoskeletal system and connective tissue	1 (0.1%)	6 (0.5%)	3 (0.2%)	8 (0.6%)	17 (1.2%)	8 (0.6%)	2 (0.1%)	2 (0.3%)	7 (1.39
XIV Diseases of the genitourinary system	33 (3.3%)	20 (1.7%)	25 (2%)	18 (1.4%)	27 (1.9%)	22 (1.6%)	40 (3%)	14 (2.4%)	(2.39
XV Pregnancy, childbirth and the puerperium	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (0.29
XVI Certain conditions originating in the perinatal period	0 (0%)	1 (0.1%)	3 (0.2%)	2 (0.2%)	2 (0.1%)	2 (0.1%)	2 (0.1%)	4 (0.7%)	3 (0.69
XVII Congenital malformations, deformations and chromosomal abnormalities	1 (0.1%)	0 (0%)	1 (0.1%)	1 (0.1%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (0.49
XVIII Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	50 (5%)	64 (5.4%)	58 (4.5%)	51 (4%)	70 (5%)	73 (5.3%)	89 (6.6%)	25 (4.2%)	(5.8
XIX Injury, poisoning and certain other consequences of external causes	133 (13.4%)	119 (10.1%)	94 (7.4%)	209 (16.5%)	145 (10.3%)	174 (12.5%)	208 (15.5%)	133 (22.5%)	1 (28.9
XX External causes of morbidity and mortality	36 (3.6%)	41 (3.5%)	40 (3.1%)	6 (0.5%)	9 (0.6%)	8 (0.6%)	11 (0.8%)	4 (0.7%)	5 (0.9
XXI Factors influencing health status and contact with health services	6 (0.6%)	10 (0.8%)	14 (1.1%)	14 (1.1%)	9 (0.6%)	2 (0.1%)	15 (1.1%)	8 (1.4%)	7 (1.3
Unknown	33 (3.3%)	55 (4.6%)	115 (9%)	75 (5.9%)	143 (10.1%)	138 (9.9%)	185 (13.8%)	55 (9.3%)	21 (49

Pre-lockdown period: 21 February – 26 March; Lockdown period: 27 March – 30 April; Post-lockdown period: 01 May – 04 June

# **BMJ** Paediatrics Open

## Cross-sectional study of paediatric case mix presenting to an emergency centre in Cape Town, South Africa during COVID-19

Journal:	BMJ Paediatrics Open
Manuscript ID	bmjpo-2020-000801.R1
Article Type:	Original research
Date Submitted by the Author:	02-Sep-2020
Complete List of Authors:	Akuaake, Lembi; Stellenbosch University Faculty of Medicine and Health Sciences, Division of Emergency Medicine Hendrikse, Clint; University of Cape Town, Division of Emergency Medicine; Mitchells Plain Hospital and Heideveld Hospital, Emergency Centre Spittal, Graeme; Mitchells Plain Hospital, Paediatric Department Evans, Katya; Mitchells Plain Hospital and Heideveld Hospital, Emergency Centre; University of Cape Town, Division of Emergency Medicine van Hoving, Daniël; Stellenbosch University Faculty of Medicine and Health Sciences, Division of Emergency Medicine
Keywords:	Epidemiology, Health services research





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# **Cross-sectional study of paediatric case mix presenting to an emergency centre in Cape Town, South Africa during COVID-19**

<sup>1</sup>Lembi Magano Akuaake, <sup>2,3</sup>Clint Hendrikse, <sup>4</sup>Graeme Spittal, <sup>2,3</sup>Katya Evans, <sup>1</sup>Daniël Jacobus van Hoving

<sup>1</sup>Division of Emergency Medicine, Stellenbosch University, Cape Town, South Africa
 <sup>2</sup>Mitchells Plain Hospital and Heideveld Hospital Emergency Centres, Cape Town, South Africa
 <sup>3</sup>Division of Emergency Medicine, University of Cape Town, Cape Town, South Africa
 <sup>4</sup>Paediatric Department, Mitchells Plain Hospital, Cape Town, South Africa

Corresponding author: Daniël J. van Hoving

Division of Emergency Medicine, Stellenbosch University

PO Box 241

Cape Town, 8000

nvhoving@sun.ac.za

Number of tables: 4

Number of figures: 1

Word count: 2714

## ABSTRACT

## Objective

To describe and compare the effect of level 5 lockdown measures on the workload and case mix of paediatric patients presenting to a district-level emergency centre in Cape Town, South Africa.

## Methods

Paediatric patients (<13 years) presenting to Mitchells Plain Hospital were included. The level 5 lockdown period (27/03/2020 - 30/04/2020) was compared to similar 5-week periods immediately before (21/02/2020 - 26/03/2020) and after the lockdown (01/05/2020 - 04/06/2020), and to similar time periods during 2018 and 2019. Patient demographics, characteristics, ICD-10 (International Statistical Classification of Diseases and Related Health Problems 10th Revision) diagnosis, disposition and process times were collected from an electronic patient tracking and registration database. The Chi-square test and the independent samples median test were used for comparisons.

## Results

Emergency centre visits during the lockdown period (n=592) decreased by 58% compared to 2019 (n=1413) and by 56% compared to the 2020 pre-lockdown period (n=1342). The proportion of under 1 year olds increased by 10.4% (p<0.001), with a 7.4% increase in self-referrals (p<0.001) and a 6.9% reduction in referrals from clinics (p<0.001). Proportionally more children were referred to inpatient disciplines (5.6%, p=0.001) and to a higher level of care (3.9%, p=0.004). Significant reductions occurred in respiratory diseases (66.9%, p<0.001), injuries (36.1%, p<0.001), and infectious diseases (34.1%, p<0.001). All process times were significantly different between the various study periods.

## Conclusion

Significantly less children presented to the emergency centre since the implementation of the COVID-19 lockdown, with marked reductions in respiratory and infectious-related diseases and in injuries.

## **KEYWORDS**

COVID-19, emergency centre, case mix, paediatric

## INTRODUCTION

Paediatric emergency care decreases childhood morbidity and mortality, but an epidemic has the potential to disrupt access to care and essential child health services.[1–3]

The corona virus disease (COVID-19) was declared a global pandemic by the World Health Organization (WHO) on 11 March 2020 and is caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).[4] The pandemic resulted in most countries implementing social distancing measures to curb the spread of the disease. The South African government implemented a national lockdown on 27 March 2020, consisting of five levels.[5] Level 5 is the most restrictive with only essential services permitted to operate and strict limitations on public transport services with regards to capacity and operating times. The sale of alcohol and tobacco is prohibited as well as any form of exercise in public spaces. Lower levels are a stepwise easing of the restrictions imposed on level 5 in varying degrees to attempt to limit community transmission and resurgence of the virus, while allowing for economic recovery. Level 1 allows for near normal activity to resume but with the recommended public health guidelines to be followed at all times, including wearing a facemask, maintaining social distancing of at least 2 meters and frequently washing or sanitising hands. The South African lockdown started at level 5, which lasted five weeks (27 March – 30 April 2020) and was followed by level 4 (1 May – 31 May 2020). Level 3 restrictions were implemented on 1 June 2020 and was still in place at the time of data collection.

The implemented lockdown measures under level 5 resulted in all non-urgent healthcare appointments being cancelled, including the de-escalation of services at community healthcare centres and the rescheduling of elective surgeries and outpatient department visits at hospital level. An upsurge in patients visiting the emergency centre was anticipated as most other healthcare services were de-escalated. Furthermore, the pandemic and subsequent lockdown periods coincided with autumn and the beginning of winter where an increase in respiratory-related cases are typically experienced, especially in the paediatric population. On the other hand, the effect of the closing of early childhood development centres and schools, as well as most parents forced to work from home, are unknown but could also change the number and type of presentations to the emergency centre.

Previous studies presented conflicting results of health care utilisation during an epidemic. An increase in paediatric patients presenting to emergency centres was seen during the swine flu (H1N1pdm09 virus) pandemic in 2009.[6–8] However, paediatric-related presentations decreased by up to 40% during the 2015 Middle East respiratory syndrome (MERS) epidemic in Korea.[9,10] A more pronounced decrease (80%) was witnessed during the 2003 Severe Acute Respiratory Syndrome (SARS) epidemic in Taiwan.[11] A decline in trauma cases presenting to emergency centres across South Africa has already been noticed,[12] but the effect of the national lockdown on paediatric presentations remains unclear. The aim of the study was to describe and compare the effect of the level 5 national COVID-19 lockdown measures on the workload and case mix of paediatric patients presenting to a district-level emergency centre in Cape Town, South Africa.

## **METHODS**

## Study design

A descriptive analysis was conducted on existing data. Data was extracted from an existing database that collects routine data prospectively (in real time).

## Study setting

Mitchells Plain Hospital is a 365-bed hospital providing district hospital health services to the surrounding community. It serves a low- to middle-income health district of approximately 600 000 people.[13,14] The health district has many social challenges, including gangsterism, crime, and drug abuse. Interpersonal violence and other injuries are particularly prevalent during weekends.[15] Mitchells Plain Hospital is situated on the outskirts of Cape Town and has an emergency centre which manages around 4 100 patients per month; 950 being children under the age of 13 years. A quarter of the children are deemed very urgent or emergent at presentation (orange or red according to the South African Triage Scale)[16] and an average of 135 are admitted to the inpatient paediatric service. Monthly paediatric presentations increase to around 1 200 during the annual respiratory surge season (March -June), of which about 190 are admitted. Normally, the paediatric department assist with providing staff for the emergency centre and non-specialist physicians from the paediatric department have been the treating clinician for around 40% of acute paediatric presentations. Since the lockdown measures came in to effect, the paediatric department has been responsible for over 90% of acute paediatric presentations to free up emergency centre staff to assist with the adult workload. This was made possible by closing the paediatric out patient department and reverting to telephonic consultations that needed less staff.

An electronic patient tracking and registration database (HECTIS - Hospital and Emergency Centre Tracking Information System) is used to collect routine clinical data for each patient that is managed within the emergency centre.

HECTIS is an official electronic application of the Western Cape Department of Health which follows the flow of patients in an emergency centre from arrival to discharge or admission. It is used by numerous emergency centres to streamline patient processes and capture data related to process times, triage scores, ICD-10 (International Statistical Classification of Diseases and Related Health Problems 10th Revision) diagnoses and dispositions. The database has been built on an Oracle platform and is stored off-site. The database is access controlled and authorised users are granted access and authorisation according to their specific clinical role. A triage nurse will thus have access to different parts of the database than a clinician in the emergency centre.

## **Study participants**

Convenience sampling was used to include all patients <13 years of age that presented to the emergency centre of Mitchells Plain Hospital over the study periods. Time periods included the level 5 lockdown period (27 March 2020 till 30 April 2020), a 5-week period immediately before the lockdown (21 February 2020 – 26 March 2020), a 5-week period immediately after the lockdown (01 May 2020 – 04 June 2020) and corresponding periods during 2018 and 2019.

## Data collection and management

Data were exported from the HECTIS database for the various study periods. Variables included age, gender, mode of transport, type of presentation, triage category, ICD-10 diagnosis, process times, and disposition. The triage category was determined at arrival to the hospital and patients were categorised into emergency (red), very urgent (orange), urgent (yellow), and non-urgent (green) as stipulated by the South African Triage Scale (SATS).[16] Patients' diagnosis was determined from ICD-10 codes documented as the main diagnosis. Disposition refers to where a patient is being discharged from the emergency centre. Patient process times were calculated from electronic timestamps and included time to triage (arrival at emergency centre to time of triage), time to consultation (arrival at emergency centre to time when emergency centre disposition was decided) and time in emergency centre (arrival at emergency centre to time when patient left the emergency centre). Process times of patients that absconded were only included to calculate the time to triage (if a triage time was documented) and were excluded from the other process times.

## **Statistical analysis**

Summary statistics were used to describe all variables. Categorical data are summarised using frequency counts and percentages, and are presented as two-way tables or bar charts. Median was used as the measure of central tendency for continuous responses and quartiles as indicators of spread. The relationship between categorical variables was determined with the Chi-square test or the Fisher's Exact test, and process times were compared with the independent samples median test. A 5% significance level was used and data were analysed using SPSS Statistics for Windows, Version 26.0 (IBM Corp. Released 2019. Armonk, NY: IBM Corp.).

## **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.

## RESULTS

## **Overall emergency centre visits**

A total of 39 905 emergency centre visits were documented over the study periods, of which 9 983 were younger than 13 years of age (a 15% reduction in all (adult and paediatric) emergency centre visits compared to 2019 was observed, as well as a 35% reduction over the lockdown period).[17] One patient was excluded as the visit only pertained to special investigations; 9 982 were thus analysed. There were 2 464 paediatric emergency centre visits during the 2020 time periods, 1 601 less than in 2019 (n=4065) and 989 less than in 2018 (n=3453). There was a 6.2% (n=78) increase in the actual number of patients seen during the 2020 pre-lockdown period compared to 2019, followed by a 58.1% (n=821) reduction for the level 5 lockdown periods and a 61.8% (n=858) reduction over the post-lockdown periods (Figure 1).

## **Demographics and characteristics**

The demographics and characteristics of patients are presented in Table 1. Significant differences during level 5 lockdown compared to the 2020 pre-lockdown period were seen in patient's age, referral type, triage category and disposition. The proportion of children younger than 1 year increased by 10.4% (p<0.001), with a decrease in the 1 to 5 year group (5.6%, p=0.022) and in patients over the age of 5 years (4.8%, p=0.02). The proportions in the age category changed as lockdown measures were eased; children over 5 years were the only group showing an increase (7.1%, p=0.005). An increase in the proportion of self referrals occurred (7.4%, p<0.001), with a subsequent decrease in referrals from primary healthcare clinics (6.9%, p<0.001) and general practitioners (0.4%, p=0.754). Children presenting during the level 5 lockdown periods were also sicker with a 2% increase in the proportion of emergency (triaged red) cases (p=0.018), although the actual number of patients decreased (n=5). The difference in triage category most likely contributed to the proportional increase of inpatient referrals (5.6%, p=0.001), as well as patients referred for higher level of care (3.9%, p=0.004). This also resulted in a proportional decrease in patients being discharged directly home from the emergency centre (5.6%, p=0.019).

Table 1. Demographics and characteristics of paediatric patients presenting to the emergency centre during the level 5 COVID-19 lockdown period and corresponding 5-week periods immediately before and after the lockdown and for two previous years.

			2018			2019			2020	
Varia bles n (%)		21 February – 26 March	27 March – 30 April	01 May - 04 June	21 February – 26 March	27 March – 30 April	01 May - 04 June	21 February – 26 March (Pre- lockdown)	27 March – 30 April (Level 5 lockdown)	01 May – 04 June (Post-lockdown)
Age (year)	<1	210 (21.2%)	372 (31.4%)	368 (28.8%)	249 (19.7%)	351 (24.8%)	312 (22.5%)	243 (18.1%)	169 (28.5%)ª	116 (21.9%) <sup>b</sup>
	1-5	528 (53.2%)	592 (50%)	677 (53%)	717 (56.7%)	766 (54.2%)	742 (53.5%)	787 (58.6%)	314 (53%)ª	279 (52.6%)
	>5	254 (25.6%)	219 (18.5%)	233 (18.2%)	298 (23.6%)	296 (20.9%)	334 (24.1%)	312 (23.2%)	109 (18.4%)ª	135 (25.5%) <sup>b</sup>
Gend er	Femal e	436 (44%)	509 (43%)	588 (46%)	537 (42.5%)	609 (43.1%)	610 (43.9%)	565 (42.1%)	267 (45.1%)	251 (47.4%)
	Male	556 (56%)	674 (57%)	690 (54%)	727 (57.5%)	804 (56.9%)	778 (56.1%)	777 (57.9%)	325 (54.9%)	279 (52.6%)
Trans port	Self	785 (79.1%)	920 (77.8%)	1082 (84.7%)	1025 (81.1%)	1171 (82.9%)	1267 (91.3%)	1115 (83.1%)	489 (82.6%)	476 (89.8%) <sup>b</sup>
meth od	Ambu lance	130 (13.1%)	178 (15%)	193 (15.1%)	152 (12%)	133 (9.4%)	120 (8.6%)	145 (10.8%)	69 (11.7%)	52 (9.8%)
	Police or Fire servic e	2 (0.2%)	1 (0.1%)	1 (0.1%)	2 (0.2%)	4 (0.3%)	1 (0.1%)	0 (0%)	0 (0%)	0 (0%)
	Unkn own	75 (7.6%)	84 (7.1%)	2 (0.2%)	85 (6.7%)	105 (7.4%)	0 (0%)	82 (6.1%)	34 (5.7%)	2 (0.4%) <sup>b</sup>
Arriv al from	Scene / home	658 (66.3%)	835 (70.6%)	907 (71%)	931 (73.7%)	1069 (75.7%)	1067 (76.9%)	1000 (74.5%)	485 (81.9%) <sup>a,c</sup>	457 (86.2%) <sup>d</sup>
	Other healt hcare facilit y	262 (26.4%)	266 (22.5%)	285 (22.3%)	250 (19.8%)	242 (17.1%)	220 (15.9%)	260 (19.4%)	74 (12.5%) <sup>a,c</sup>	52 (9.8%) <sup>d</sup>
	Gener al Practi tioner	72 (7.3%)	82 (6.9%)	86 (6.7%)	83 (6.6%)	99 (7%)	101 (7.3%)	81 (6%)	33 (5.6%)	21 (4%) <sup>d</sup>
	Unkn own	0 (0%)	0 (0%)	0 (0%)	0 (0%)	3 (0.2%)	0 (0%)	1 (0.1%)	0 (0%)	0 (0%)
Triag e categ ory	Non- urgen t (Gree n)	238 (24%)	202 (17.1%)	202 (15.8%)	311 (24.6%)	287 (20.3%)	241 (17.4%)	344 (25.6%)	142 (24%)	172 (32.5%) <sup>b,d</sup>
	Urgen t (Yello w)	516 (52%)	622 (52.6%)	760 (59.5%)	639 (50.6%)	758 (53.6%)	733 (52.8%)	663 (49.4%)	300 (50.7%)	256 (48.3%)
	Very urgen t (Oran ge)	181 (18.2%)	286 (24.2%)	255 (20%)	246 (19.5%)	294 (20.8%)	351 (25.3%)	267 (19.9%)	115 (19.4%)	78 (14.7%) <sup>b,d</sup>
	Emer gency (Red)	33 (3.3%)	41 (3.5%)	35 (2.7%)	39 (3.1%)	40 (2.8%)	35 (2.5%)	30 (2.2%)	25 (4.2%)ª	17 (3.2%)
	Unkn own	24 (2.4%)	32 (2.7%)	26 (2%)	29 (2.3%)	34 (2.4%)	28 (2%)	38 (2.8%)	10 (1.7%)	7 (1.3%)
Dispo sition	Death	2 (0.2%)	0 (0%)	1 (0.1%)	1 (0.1%)	4 (0.3%)	3 (0.2%)	4 (0.3%)	4 (0.7%)	0 (0%)
	Refer red to in- hospi tal discip lines	193 (19.5%)	251 (21.2%)	293 (22.9%)	210 (16.6%)	209 (14.8%)	159 (11.5%)	163 (12.1%) <sup>e</sup>	105 (17.7%) <sup>a</sup>	91 (17.2%) <sup>d</sup>
	Disch	674 (67.9%)	770 (65.1%)	817 (63.9%)	862 (68.2%)	946 (66.9%)	983	871 (64.9%)	351 (59.3%) <sup>a,c</sup>	346 (65.3%) <sup>b,d</sup>
	arged Absco nded	28 (2.8%)	42 (3.6%)	(63.9%) 58 (4.5%)	66 (5.2%)	99 (7%)	(70.8%) 92 (6.6%)	160 (11.9%) <sup>e</sup>	33 (5.6%)ª	13 (2.5%) <sup>b,d</sup>
	Trans ferre d to highe r level facilit	58 (5.8%)	86 (7.3%)	(4.9%) 62 (4.9%)	101 (8%)	90 (6.4%)	(6.3%) (6.3%)	92 (6.9%)	64 (10.8%) <sup>»,c</sup>	65 (12.3%) <sup>d</sup>
	y Refer to other	37 (3.7%)	34 (2.9%)	47 (3.7%)	24 (1.9%)	65 (4.6%)	64 (4.6%)	52 (3.9%) <sup>e</sup>	35 (5.9%)	15 (2.8%) <sup>b</sup>

<sup>a</sup> Statistically significant difference (p<0.05) between pre-lockdown period 2020 and level 5 lockdown period 2020 (see supplementary table 1)

<sup>b</sup> Statistically significant difference (p<0.05) between level 5 lockdown period 2020 and post-lockdown period 2020 (see supplementary table 1)

<sup>c</sup> Statistically significant difference (p<0.05) between level 5 lockdown period 2019 and 2020 (see supplementary table 1)

<sup>d</sup> Statistically significant difference (p<0.05) between post-lockdown period 2019 and 2020 (see supplementary table 1)

<sup>e</sup> Statistically significant difference (p<0.05) between pre-lockdown period 2019 and 2020 (see supplementary table 1)

## **Diagnostic categories**

The top three diagnostic categories during the level 5 lockdown were related to the respiratory system (n=141, 23.8%), injuries and poisonings (n=133, 22.5%), and infectious diseases (n=110, 18.6%). In the different age groups, infectious diseases were most frequent in the under 1 year group (n=52, 30.8%), respiratory-related diseases in the 1-5 year group (n=84, 26.8%), and injury-related presentations in the over 5 year group (n=46, 14.6%) (Table 2). The top five diagnostic categories per age group and per time period is presented in Supplementary table 2. The actual number of presentations during the level 5 lockdown decreased in all the diagnostic categories compared to the 2020 pre-lockdown period (Table 3). Significant reductions occurred in respiratory diseases (n=285, 66.9%, p<0.001), injuries (n=75, 36.1%, p<0.001), and infectious and parasitic diseases (n=57, 34.1%, p<0.001). Proportionally, diseases of the respiratory system decreased by 7.9%, infectious-related diseases increased by 6.2%, and injuries increased by 7.0% (Table 3) (see supplementary table 3 for the diagnostic categories for all the time periods). In admitted patients, actual infectious-related diseases decreased by 40% (n=24) and diseases of the respiratory system by 63% (n=67) during the lockdown period compared to 2019. A 28% (n=14) reduction was seen in actual infectious-related and respiratory-related diseases comparing the 2020 lockdown periods (see supplementary table 4 for the diagnostic categories of admitted patients). In patients transferred to higher level of care, actual infectious-related diseases increased by 91% (n=10) and injuries by 33% (n=4) during the lockdown period compared to 2019. A 30% (n=7) reduction was seen in the actual number of injuries and a 5% (n=1) increase in infectious-related diseases comparing the 2020 lockdown periods (see supplementary table 5 for the diagnostic categories of transferred patients).

Table 2. Top five diagnostic categories per age group presenting to the emergency centre during the level 5 COVID-19 lockdown period.

	All			<1 year		1-5 year		> 5 year			
Rank	ICD-10	N (%)	Rank	ICD-10	n (%)	Rank	ICD-10	n (%)	Rank	ICD-10	n (%)
	Category			Category			Category			Category	
1	Respiratory	141 (23.8)	1	Infectious	52	1	Respirator	84	1	Injury and	46
	system			diseases	(30.8)		y system	(26.8)		poisoning	(14.6)
2	Injury and	133 (22.5)	2	Respiratory	43	2	Injury and	79	2	Respirator	14
	poisoning			system	(25.4)		poisoning	(25.2)		y system	(4.5)
3	Infectious	110 (18.6)	3	Findings, not	13	3	Infectious	47	3	Infectious	11
	diseases			elsewhere	(7.7)		diseases	(15.0)		diseases	(3.5)
				classified							

Nervous       30 (5.1)       4       Skin and subcutaneous       11       4       Nervous       16       4       Nervous       10         Skin and subcutaneou       26 (4.4)       5       Injury and poisoning       8       5       Ear and mastoid       14       5       Digestive       5         Stin and subcutaneou       26 (4.4)       5       Injury and poisoning       8       5       Ear and mastoid       14       5       Digestive       5         Stisue       10       14       14       5       Digestive       5       (1.6)         LO: International Statistical Classification of Diseases and Related Health Problems, 10th revision       10th revision       10th revision
Skin and subcutaneou s tissue26 (4.4)5Injury and poisoning85Ear and mastoid process145Digestive system55LO: International Statistical Classification of Diseases and Related Health Problems, 10th revisionClassification of Diseases and Related Health Problems, 10th revision
10: International Statistical Classification of Diseases and Related Health Problems, 10th revision

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Table 3. Actual and proportional of	Serences of paediatric presentations to the emergency centre during the level 5 lockdown period, compared to similar time
periods.	S ept

	2020 vs 2018												202	0 vs 2019	9				2020					
	м	ebruary Iarch (Pro ockdown	e-	Ap	March – oril (Leve ockdowr	15	01 May - 04 June (Post- lockdown)			21 February – 26 March (Pre- lockdown)			27 March – 30 April (Level 5 lockdown)			01 May – 04 June (Post-lockdown)			21 February – 26∰March (Pre- lockdown) vs 27 M≩rch – 30 April (Level 5 lockdown)			27 March – 30 April (Level 5 lockdown) vs 01 May – 04 June (Post-lockdown)		
10 categ ory	Ac tu al n (% )	Prop ortio nal	р	Ac tu al n (%)	Prop ortio nal	р	Ac tu al n (% )	Prop ortio nal	a	Actu al n (%)	Prop ortio nal	р	Actu al n (%)	Prop ortio nal	p	Actu al n (%)	Prop ortio nal	р	Actual n (%)	Proportiona Downloaded	р	Actual n (%)	Proportiona I	p
itic disea	- 53 (- 31 .7)	9.8%	0. 57 4	97 (- 88 .2)	1.1%	0. 56 4	- 15 5 (- 22 1. 4)	4.4%	0. 21 0	-80 (- 32.4 )	-7.1%	<0. 00 1	-118 (- 51.8 )	2.5%	0. 19 1	-97 (- 58.1 )	1.2%	0. 48 6	-57 (-34.1)	f <sup>6.2%</sup> from http://bmjpaedsope	<0.001	-40 (-36.4)	-5.4%	0.02
VI Disea ses of the nervo us syste m	21 (5 0)	1.0%	<0 .0 01	14 (4 6. 7)	3.7%	<0 .0 01	-8 (- 50 )	1.1%	0. 13 3	-7 (- 14.3 )	-0.8%	0.3 37	-14 (- 31.8 )	2.0%	0. 03 8	-23 (- 59.0 )	0.2%	0. 87 8	-12 (-28.6)	en.bmj.com/ on April (	0.050	-14 (-46.7)	-2.1%	0.09
VIII Disea ses of the ear and	40 (6 1. 5)	2.3%	0. 92 7	- 23 (- 10 4. 5)	0.1%	0. 92 7	- 52 (- 37 1. 4)	2.6%	0. 01 8	22 (51. 2)	1.4%	0.0 76	-42 (- 65.6 )	- 0.8%	0. 46 9	-50 (- 78.1 )	2.0%	0. 05 3	-43 (-66.2)	19, 2024 by guest.	0.287	-8 (-36.4)	-1.1%	0.3
	5) 11 8 (2	0.7%	/ <0 .0 01	- 35 9	- 18.5 %	, <0 .0 01	- 37 8	- 14.8 %	<0 .0 01	-16 (- 3.6)	-3.3%	0.0 81	-411 (-	- 15.3 %	<0 .0 01	-466 (-	- 17.9 %	<0 .0 01	-285 (- 66.9)	Protected by copyright.	<0.001	-7 (-5.0)	1.5%	0.5

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#### **Process times**

All process times were significantly different between the various study periods (Table 4). Comparing median times between the level 5 lockdown period and the 2020 pre-lockdown period, time to triage decreased by 7 minutes (p<0.001), time to consultation by 91 minutes (p<0.001), time to deciding disposition by 76 minutes (p<0.001), and length of stay within the emergency centre by 41 minutes (p=0.003).

Table 4. Process times for paediatric patients (n=9308) presenting to the emergency centre during the 5-week COVID-19 level 5 lockdown period and corresponding periods for three years prior to the lockdown.

		2018			2019			2020		р
Process times (minutes), median(Q1-Q3)* [maximum]	21 February – 26 March	27 March – 30 April	01 Ma y – 04 Jun e	21 February – 26 March	27 March – 30 April	01 Ma y – 04 Jun e	21 February – 26 March (Pre-lockdown)	27 March – 30 April (Level 5 lockdown)	01 May – 04 June (Post- lockdo wn)	
Time to triage	12 (5-31) [581]	15 (4-39) [803]	20 (7- 47) [46 0]	19 (6-47) [612]	22 (7-52) [565]	16 (5- 43) [36 8]	19 (6-49) [665]	12 (4-33) [308]	14 (5- 34) [1461]	<0.0 01
Time to consultation	81 (45-132) [1067]	95 (54-159) [905]	104 (59- 171 ) [12 22]	107 (61-187) [654]	119 (66-214) [742]	118 (65- 208 ) [68 5]	140 (71-235) [872]	49 (42-122) [590]	59 (29- 101) [1054]	<0.0 01
Time to disposition decision	146 (94-216) [1437]	157 (99-242) [1146]	160 (10 6- 246 ) [12 91]	190 (121-295) [1521]	193 (121- 314) [1506]	191 (11 2- 291 ) [10 26]	245 (156-365) [3337]	169 (95-267) [1918]	123 (70- 204) [1773]	<0.0 01
Time in emergency centre	188 (126-278) [1438]	205 (129- 320) [1797]	207 (13 0- 330 ) [38 00]	274 (165-495) [2043]	262 (146- 428) [1717]	251 (14 2- 411 ) [26 32]	311 (200-492) [3353]	270 (153- 459) [2349]	164 (85- 423) [1984]	<0.0 01

\*Q1-Q3: 25th to 75th percentile

## DISCUSSION

The volume of children visiting the emergency centre during and after the level 5 lockdown period was significantly lower than similar previous time periods. Significant reductions in the number of presentations were seen in respiratory diseases, infectious diseases and injuries (Table 3). A reduction in the proportion of diseases related to the respiratory system occurred in all age groups, while infectious diseases increased in younger patients (<1 year) and injuries increased in children older than one year.

The overall reduction in paediatric emergency centre visits is similar to experiences from the SARS and MERS pandemics, as people tend to avoid or delay attending hospitals due to the fear of contracting the communicable disease.[9–11] Anecdotal evidence do suggest that attendance to the primary healthcare

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services also decreased. This is of concern and child health needs to be monitored closely over the coming 12 months. The likely reduction in immunisations, specifically measles, could result in outbreaks of non-COVID-19 communicable diseases causing more morbidity and mortality.[3] The impact of this would be substantially worse in impoverished communities.

The reduction in respiratory and infectious-related diseases were substantial contributors to the overall reduction in emergency centre attendance, although the proportion of children with infectious diseases increased. These reductions are most likely multifactorial, and one important consideration could be the closing of early childhood development centres. It has been well documented that children attending crèches have a higher incidence of infectious diseases, including respiratory tract infections.[18,19] About three quarters of paediatric emergency centre attendees at Mitchells Plain Hospital are children under the age of 5 years, of whom a large proportion will normally be in formal or informal crèches while their parents work. The lockdown measures forced most parents to stay at home, thereby further reducing children's exposure to infections (COVID-19 and other) as trips to shops or work were limited.

Children presenting with injuries and poisoning decreased by a third during the level 5 lockdown period, but increased proportionally by 7% (Table 3). This was not expected and could be from children bypassing the community healthcare centres; thus children with minor injuries also presented to the hospital. On the other hand, the home is one of the most dangerous places for children. It is estimated that around 90% of unintentional injuries in young children occur in or around their home when they are supposedly being supervised by a caregiver.[20] Injury risk could also have increased if children became bored at home, while parents were most likely frustrated in the constant supervision of the children. Furthermore, anecdotal evidence suggest that the number of child abuse cases did not decrease during the lockdown periods and remain on a similar trend than before.[21] Another possible reason is the longstanding problem in South Africa where many children are looking after themselves and other children, with an understandable lack of adequate supervision.

The main strength of the study is the use of a comprehensive database that is completed in real time. Although data are not cross-checked, we expect the data to be adequately reflecting the truth. However, care should be taken to generalise the results of the study to other healthcare facilities as it reflects a single centre in a fairly distinctive setting. Diseases were categorised according to diagnostic codes (ICD-10) assigned by attending physicians. A diagnostic code was not assigned to around 10% of patients. We also did not validate whether the correct diagnosis were made, neither did we attempt to ensure that the correct diagnostic code were assigned to the diagnosis. This could have resulted in non-systematic error.

### CONCLUSION

Significantly less children presented to the emergency centre since the implementation of the national COVID-19 level 5 lockdown. The closure of early childhood development centres and schools, together with the restriction of movement of children and their caregivers, markedly reduced the infectious and

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# CONTRIBUTIONS

DJvH and CH conceived the study. MA, CH, and KE undertook data collection. MA and DJvH cleaned the data, and DJvH and CH did the data analyses. MA drafted the manuscript and the remaining authors critiqued the paper for important intellectual content. All authors read and approved the final version of the manuscript. MA is the guarantor.

# FUNDING

The study was self-funded.

# **COMPETING INTERESTS**

None declared.

# ETHICS APPROVAL

The study was approved by the Health Research Ethics Committee of Stellenbosch University (Ref: N20/04/009\_COVID-19) and included a waiver of informed consent.

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# WHAT IS ALREADY KNOWN ON THIS TOPIC

- \_ The volume of children attending emergency centres varied during previous epidemics
- Paediatric emergency centre attendances decreased during COVID-19 \_

# WHAT THIS STUDY ADDS

- Significantly less children presented to the emergency centre since the implementation of national COVID-19 level 5 lockdown
- <text><text><text> A greater proportion, but smaller numbers of younger and sicker children attended the emergency centre during the COVID-19 lockdown
- Marked reductions occurred in respiratory diseases, infectious-related diseases, and in injuries -
- The proportion of infectious diseases increased in patients <1 year, while injuries increased in older children

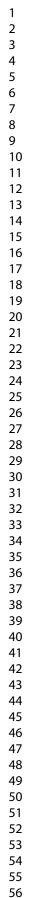
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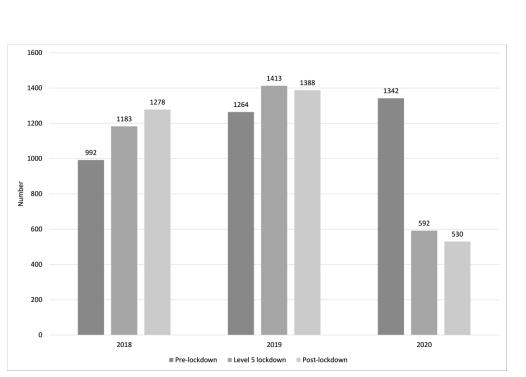
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Supplementary table 1. Differences between different study periods of demographic and clinical characteristics of paediatric patients presenting to the emergency centre

			2020 vs 2	2019			2020				
	21 Februar March	•	27 March – 3	30 April	01 May – 0	4 June	Pre-lockdown lockdov		Level 5 lock Post-lock		
Variables n (%)	n (%)	р	n (%)	р	n (%)	р	n (%)	р	n (%)	р	
Age (year)											
<1	-6 (-2.4)	0.317	-182 (-51.9)	0.094	-196 (-62.8)	0.806	-74 (-30.5)	<0.001	-53 (-31.4)	0.011	
1-5	70 (9.7)	0.322	-452 (-59.0)	0.659	-463 (-62.4)	0.759	-473 (-60.1)	0.022	-35 (-11.1)	0.905	
>5	14 (4.)	0.853	-187 (-63.2)	0.201	-199 (-59.6)	0.553	-203 (-65.1)	0.020	26 (23.9)	0.00	
Gender											
Female	28 (5.2)	0.874	-342 (-56.2)	0.430	-359 (-58.9)	0.182	-298 (-52.7)	0.232	-16 (-6.0)	0.472	
Male	50 (6.9)	0.000	-479 (-59.6)		-499 (-64.1)	0.000	-452 (-58.2)	0.000	-46 (-14.2)	0.000	
Transport method											
Self	90 (8.8)	0.201	-682 (-58.2)	0.897	-791 (-62.4)	0.330	-626 (-56.1)	0.844	-13 (-2.7)	0.002	
Ambulance	-7 (-4.6)	0.355	-64 (-48.1)	0.143	-68 (-56.7)	0.475	-76 (-52.4)	0.637	-17 (-24.6)	0.336	
Police or Fire service	-2 (-100)	0.235	-4 (-100)	0.326	-1 (-100)	1.000	0 (0)		0 (0)		
Unknown	-3 (-3.5)	0.575	-71 (-67.6)	0.179	2 (200)	0.076	-48 (-58.5)	0.758	-32 (-94.1)	<0.00	
Arrival from	- ( )										
Scene / home	69 (7.4)	0.623	-584 (-54.6)	0.002	-610 (-57.2)	<0.001	-515 (-51.5)	<0.001	-28 (-5.8)	0.051	
Other healthcare facility	10 (4)	0.805	-168 (-69.4)	0.011	-168 (-76.4)	0.001	-186 (-71.5)	<0.001	-22 (-29.7)	0.157	
General Practitioner	-2 (-2.4)	0.628	-66 (-66.7)	0.277	-80 (-79.2)	0.009	-48 (-59.3)	0.754	-12 (-36.4)	0.213	
Unknown	1 (100)	1.000	-3 (-100)	0.560	0 (0)		-1 (-100)	1.000	0 (0)	-	
Triage category											
Non-urgent (Green)	33 (10.6)	0.557	-145 (-50.5)	0.073	-69 (-28.6)	<0.001	-202 (-58.2)	0.460	-30 (-14.2)	0.002	
Urgent (Yellow)	24 (3.7)	0.292	-458 (-60.4)	0.239	-477 (-65.1)	0.082	-363 (-58.7)	0.622	-44 (-21.1)	0.437	
Very urgent (Orange)	21 (8.5)	0.805	-179 (-60.9)	0.504	-273 (-77.8)	<0.001	-152 (-54.8)	0.853	-37 (-14.7)	0.039	
Emergency (Red)	-9 (-23.1)	0.182	-15 (-37.5)	0.128	-18 (-51.4)	0.432	-5 (-56.9)	0.018	-8 (-32.2)	0.432	
Unknown	9 (31.0)	0.458	-24 (-70.6)	0.404	-21 (-75)	0.347	-28 (-73.7)	0.155	-3 (-30)	0.63	
Disposition											
Referred to in- hospital disciplines	3 (300)	0.376	0 (0)	0.246	-3 (-100)	0.565	0 (0)	0.258	-4 (-100)	0.12	
Discharged	-47 (-22.4)	0.001	-104 (-49.8)	0.106	-68 (-42.8)	0.001	-58 (-35.6)	0.001	-14 (-13.3)	0.814	
Absconded	9 (1.0)	0.081	-595 (-62.9)	0.001	-637 (-64.8)	0.020	-520 (-59.7)	0.019	-5 (-1.4)	0.042	
Transferred to higher level facility	94 (142.4)	0.001	-66 (-66.7)	0.277	-79 (-85.9)	0.001	-127 (-79.4)	0.001	-20 (-60.6)	0.01	
Refer to other	-9 (-8.9)	0.295	-26 (-28.9)	0.001	-22 (-25.3)	< 0.001	-28 (-30.4)	0.001	1 (1.6)	0.45	
Referred to in- hospital disciplines	28 (116.7)	0.003	-30 (-46. 2)	0.260	-49 (-76.6)	0.094	-17 (-32.7)	0.056	-20 (-57.1)	0.01	

Pre-lockdown period: 21 February – 26 March; Lockdown period: 27 March – 30 April; Post-lockdown period: 01 May – 04 June

Supplementary table 2. Top five diagnostic categories per age group presenting to the emergency centre during the level 5 COVID-19 lockdown period and similar time periods.

27 March – 30 April	2019	21 February – 26 Mar (Pre-lockdown		27 March – 30 April (level 5 lockdow		01 May – 04 June 202 lockdown)	20 (Post-
ICD-10 Category	n (%)	ICD-10 Category	n (%)	ICD-10 Category	n (%)	ICD-10 Category	n (%)
All							
Respiratory system	442	Respiratory system	426	Respiratory system	141	Injury and poisoning	153
	(35.0)		(31.7)		(23.8)		(28.9
Infectious diseases	247	Injury and poisoning	208	Injury and poisoning	133	Respiratory system	13
	(19.5)		(15.5)		(22.5)		(25.3
Injury and poisoning	209	Infectious diseases	167	Infectious diseases	110	Infectious diseases	7
	(16.5)		(12.4)		(18.6)		(13.2
Findings, not	51	Findings, not	89	Nervous system	30	Findings, not	3
elsewhere classified	(4.0)	elsewhere classified	(6.6)		(5.1)	elsewhere classified	(5.8
Nervous system	49	Ear and mastoid	65	Skin and	26	Digestive system	2
	(3.9)	process	(4.8)	subcutaneous tissue	(4.4)		(4.5
						Skin and	2
						subcutaneous tissue	(4.5
<1 year							
Respiratory system	200	Respiratory system	78	Infectious diseases	52	Infectious diseases	3
	(57.0)		(32.1)		(30.8)		(28.4
Infectious diseases	65	Infectious diseases	61	Respiratory system	43	Respiratory system	2
	(18.5)		(25.1)		(25.4)		(25.0
Findings, not	11	Findings, not	20	Findings, not	13	Injury and poisoning	1
elsewhere classified	(3.1)	elsewhere classified	(8.2)	elsewhere classified	(7.7)		(11.2
Injury and poisoning	10	Injury and poisoning	18	Skin and	11	Skin and	9 (7.8
	(2.8)		(7.4)	subcutaneous tissue	(6.5)	subcutaneous tissue	
Skin and	7 (2.0)	Skin and	10	Injury and poisoning	8 (4.7)	Digestive system	6 (5.2
subcutaneous tissue		subcutaneous tissue	(4.1)				
Ear and mastoid	7 (2.0)						
process				•			
1-5 year							
Respiratory system	294	Respiratory system	284	Respiratory system	84	Injury and poisoning	9
	(38.4)		(36.1)		(26.8)	<i>j. , p 0</i>	(33.3
Infectious diseases	125	Injury and poisoning	108	Injury and poisoning	79	Respiratory system	7
	(16.3)	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	(13.7)		(25.2)		(28.3
Injury and poisoning	78	Infectious diseases	91	Infectious diseases	47	Infectious diseases	2
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	(10.2)		(11.6)		(15.0)		(8.2
Ear and mastoid	50	Ear and mastoid	51	Nervous system	16	Findings, not	2
process	(6.5)	process	(6.5)		(5.1)	elsewhere classified	(7.2
Findings, not	32	Findings, not	36	Ear and mastoid	14	Ear and mastoid	1
elsewhere classified	(4.2)	elsewhere classified	(4.6)	process	(4.5)	process	(4.3
> 5 year							
Respiratory system	58	Injury and poisoning	82	Injury and poisoning	46	Injury and poisoning	4
Respiratory system	(7.6)		(10.4)		(14.6)	injury and poisoning	(16.8
Injury and poisoning	57	Respiratory system	64	Respiratory system	14	Respiratory system	2
injury and poisoning	(7.4)	hespiratory system	(8.1)	hespiratory system	(4.5)	nespiratory system	(9.3
Infectious diseases	38	Findings, not	33	Infectious diseases	11	Infectious diseases	1
	(5.0)	elsewhere classified	(4.2)		(3.5)		(5.0
Findings, not	27	Nervous system	19	Nervous system	10	Digestive system	1
elsewhere classified	(3.5)		(2.4)		(3.2)	- Bestite System	(4.3
Nervous system	24	Skin and	16	Digestive system	5 (1.6)	Nervous system	7 (2.
	(3.1)	subcutaneous tissue	(2.0)	- Bestive system	5 (1.0)		, (2
	(0.1)	Genitourinary system	16		1		1
		Series and y system	(2.0)				

ICD-10: International Statistical Classification of Diseases and Related Health Problems, 10th revision

 Supplementary table 3. Diagnostic categories of paediatric patients presenting to the emergency centre during the level 5 COVID-19 lockdown period and corresponding time periods.

		2018			2019			2020	
ICD-10 Category, n(%)	21 February – 26 March	27 March – 30 April	01 May – 04 June	21 February – 26 March	27 March – 30 April	01 May – 04 June	21 February – 26 March (Pre- lockdown)	27 March – 30 April (Level 5 lockdown)	01 May – 04 June (Post- lockdown)
I Certain infectious and parasitic diseases	220 (22.2%)	207 (17.5%)	225 (17.6%	247 (19.5%)	228 (16.1%)	167 (12%)	167 (12.4%)	110 (18.6%)	70 (13.2%
II Neoplasms	1 (0.1%)	2 (0.2%)	0 (0%)	0 (0%)	3 (0.2%)	2 (0.1%)	0 (0%)	0 (0%)	0 (0%
III Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	0 (0%)	0 (0%)	1 (0.1%)	2 (0.2%)	1 (0.1%)	0 (0%)	1 (0.1%)	1 (0.2%)	3 (0.6%
IV Endocrine, nutritional and metabolic diseases	1 (0.1%)	1 (0.1%)	7 (0.5%)	8 (0.6%)	7 (0.5%)	8 (0.6%)	2 (0.1%)	1 (0.2%)	2 (0.4%
V Mental and behavioural disorders	1 (0.1%)	3 (0.3%)	3 (0.2%)	2 (0.2%)	0 (0%)	6 (0.4%)	0 (0%)	2 (0.3%)	0 (0%
VI Diseases of the nervous system	21 (2.1%)	16 (1.4%)	24 (1.9%)	49 (3.9%)	44 (3.1%)	39 (2.8%)	42 (3.1%)	30 (5.1%)	16 (3%
VII Diseases of the eye and adnexa	6 (0.6%)	4 (0.3%)	8 (0.6%)	10 (0.8%)	11 (0.8%)	14 (1%)	9 (0.7%)	2 (0.3%)	1 (0.2%
VIII Diseases of the ear and mastoid process	25 (2.5%)	45 (3.8%)	66 (5.2%)	43 (3.4%)	64 (4.5%)	64 (4.6%)	65 (4.8%)	22 (3.7%)	14 (2.6%
IX Diseases of the circulatory system	0 (0%)	0 (0%)	2 (0.2%)	3 (0.2%)	6 (0.4%)	2 (0.1%)	1 (0.1%)	1 (0.2%)	0 (0%
X Diseases of the respiratory system	308 (31%)	500 (42.3%)	512 (40.1%	442 (35%)	552 (39.1%)	600 (43.2%	426 (31.7%)	141 (23.8%)	134 (25.3%
XI Diseases of the digestive system	34 (3.4%)	30 (2.5%)	27 (2.1%)	26 (2.1%)	29 (2.1%)	23 (1.7%)	28 (2.1%)	11 (1.9%)	24 (4.5%
XII Diseases of the skin and subcutaneous tissue	82 (8.3%)	59 (5%)	50 (3.9%)	48 (3.8%)	46 (3.3%)	36 (2.6%)	49 (3.7%)	26 (4.4%)	24 (4.5%
XII Diseases of the musculoskeletal system and connective tissue	1 (0.1%)	6 (0.5%)	3 (0.2%)	8 (0.6%)	17 (1.2%)	8 (0.6%)	2 (0.1%)	2 (0.3%)	7 (1.3%
XIV Diseases of the genitourinary system	33 (3.3%)	20 (1.7%)	25 (2%)	18 (1.4%)	27 (1.9%)	22 (1.6%)	40 (3%)	14 (2.4%)	12 (2.3%
XV Pregnancy, childbirth and the puerperium	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (0.2%
XVI Certain conditions originating in the perinatal period	0 (0%)	1 (0.1%)	3 (0.2%)	2 (0.2%)	2 (0.1%)	2 (0.1%)	2 (0.1%)	4 (0.7%)	3 (0.6%
XVII Congenital malformations, deformations and chromosomal abnormalities	1 (0.1%)	0 (0%)	1 (0.1%)	1 (0.1%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (0.4%
XVIII Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	50 (5%)	64 (5.4%)	58 (4.5%)	51 (4%)	70 (5%)	73 (5.3%)	89 (6.6%)	25 (4.2%)	31 (5.8%
XIX Injury, poisoning and certain other consequences of external causes	133 (13.4%)	119 (10.1%)	94 (7.4%)	209 (16.5%)	145 (10.3%)	174 (12.5% )	208 (15.5%)	133 (22.5%)	153 (28.9%
XX External causes of morbidity and mortality	36 (3.6%)	41 (3.5%)	40 (3.1%)	6 (0.5%)	9 (0.6%)	8 (0.6%)	11 (0.8%)	4 (0.7%)	5 (0.9%
XXI Factors influencing health status and contact with health services	6 (0.6%)	10 (0.8%)	14 (1.1%)	14 (1.1%)	9 (0.6%)	2 (0.1%)	15 (1.1%)	8 (1.4%)	7 (1.3%
Unknown	33 (3.3%)	55 (4.6%)	115 (9%)	75 (5.9%)	143 (10.1%)	138 (9.9%)	185 (13.8%)	55 (9.3%)	21 (4%

BMJ Paediatrics Open Page 2 Supplementary table 4. Diagnostic categories of paediatric patients admitted during the level 5 COVID-19 lockdown period and corresponding 5-week periods immediately before and after the lockdown and for two previous years. l on 2:

		2018			2019			Sep	2020	
	21 February – 26 March	27 March – 30 April	01 May – 04 June	21 February – 26 March	27 March – 30 April	01 May – 04 June	21 February – 26 March (Pre-lockdown)	ptembe	27 March – 30 April (Level 5 lockdown)	01 May – 04 June (Post-lockdown)
ICD-10 category	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	r 2020	n (%)	n (%)
I Certain infectiou s and parasitic diseases	82 (42.5%)	78 (31.1%)	85 (29.0%)	64 (30.5%)	60 (28.7%)	37 (23.3%)	50 (30.7%)	r 2020. Downloaded f	36 (34.3%)	29 (31.9%)
VI Diseases of the nervous system	9 (4.7%)	8 (3.2%)	8 (2.7%)	28 (13.3%)	19 (9.1%)	12 (7.5%)	20 (12.3%)	from http://bmjp	7 (6.7%)	4 (4.4%)
VIII Diseases of the ear and mastoid process	3 (1.6%)	1 (0.4%)	2 (0.7%)	1 (0.5%)	3 (1.4%)	8 (5.0%)	6 (3.7%)	from http://bmjpaedsopen.bmj.com	1 (1.0%)	0 (0.0%)
X Diseases of the respirato ry system	73 (37.8%)	140 (55.8%)	131 (44.7%)	98 (46.7%)	107 (51.2%)	72 (45.4%)	56 (34.4%)	V on April 19, 2024	40 (38.1%)	37 (40.7%)
XI Diseases of the digestive system	2 (1.0%)	1 (0.4%)	1 (0.3%)	1 (0.5%)	0 (0.0%)	2 (1.3%)	2 (1.2%)	by guest.	2 (1.9%)	0 (0.0%)
XII Diseases of the skin and subcuta	7 (3.6%)	4 (1.6%)	1 (0.3%)	1 (0.5%)	3 (1.4%)	1 (0.6%)	4 (2.5%)	Protected by copyright.	0 (0.0%)	1 (1.1%)

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4 (2. %) 10 (5.2%)	1 (0.4%)	0 (0.0%)	2 (1.0%)	1 (0.5%)	0 (0.0%)	7 (4.3%)	-2020-00 00801 on 4 (3.8%)	3 (3.3%)
	1 (0.4%)	0 (0.0%)	2 (1.0%)	1 (0.5%)	0 (0.0%)	7 (4.3%)	9 4 (3.8%)	3 (3.3%)
10 (5.2%)							22 September	
	14 (5.6%)	15 (5.1%)	9 (4.3%)	6 (2.9%)	14 (8.8%)	13 (8.0%)	6 (5.7%) 2020. Downloaded from http://bmjpaedsopen.t	5 (5.5%)
1 (0.5%)	1 (0.4%)	5 (1.7%)	1 (0.5%)	1 (0.5%)		3 (1.8%)	mj.com/ on April 19, 2024 by g	3 (3.3%)
2 (1.0%)	3 (1.2%)	45 (15.4%)	5 (2.4%)	9 (4.3%)	11 (6.9%)	2 (1.2%)	leg 8 (7.6%)	9 (9.9%) 91 (100%)
		2 (1.0%) 3 (1.2%)	2 (1.0%) 3 (1.2%) 45 (15.4%)	2 (1.0%) 3 (1.2%) 45 (15.4%) 5 (2.4%)	1 (0.5%)         1 (0.4%)         5 (1.7%)         1 (0.5%)         1 (0.5%)           2 (1.0%)         3 (1.2%)         45 (15.4%)         5 (2.4%)         9 (4.3%)	1 (0.5%)         1 (0.4%)         5 (1.7%)         1 (0.5%)         1 (0.5%)         2 (1.3%)           2 (1.0%)         3 (1.2%)         45 (15.4%)         5 (2.4%)         9 (4.3%)         11 (6.9%)	1 (0.5%)         1 (0.4%)         5 (1.7%)         1 (0.5%)         1 (0.5%)         2 (1.3%)         3 (1.8%)           2 (1.0%)         3 (1.2%)         45 (15.4%)         5 (2.4%)         9 (4.3%)         11 (6.9%)         2 (1.2%)	1 (0.5%)       1 (0.4%)       5 (1.7%)       1 (0.5%)       1 (0.5%)       2 (1.3%)       3 (1.8%)       1 (1.0%)         1 (0.5%)       1 (0.5%)       1 (0.5%)       2 (1.3%)       3 (1.8%)       1 (1.0%)         1 (0.5%)       1 (0.5%)       1 (0.5%)       1 (0.5%)       2 (1.3%)       3 (1.8%)       1 (1.0%)         1 (1.0%)       1 (0.5%)       1 (0.5%)       1 (0.5%)       1 (0.5%)       2 (1.3%)       3 (1.8%)       1 (1.0%)         1 (1.0%)       1 (0.5%)       1 (0.5%)       1 (0.5%)       1 (0.5%)       2 (1.3%)       3 (1.8%)       1 (1.0%)         2 (1.0%)       3 (1.2%)       45 (15.4%)       5 (2.4%)       9 (4.3%)       11 (6.9%)       2 (1.2%)       1 (2.1%)

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		2018			2019			pter 2020	
	21 February – 26 March	27 March – 30 April	01 May – 04 June	21 February – 26 March	27 March – 30 April	01 May – 04 June	21 February – 26 March (Pre-lockdown)	ຍັງ 27 March – 30 April ຊຸ (Level 5 lockdown)	01 May – 04 June (Post-lockdown)
CD-10 category	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	<b>n (%)</b>	n (%)
Certain nfectiou and barasitic diseases	9 (15.5%)	15 (17.4%)	7 (11.3%)	15 (14.9%)	11 (12.2%)	11 (12.6%)	20 (21.7%)	ownloaded from	7 (10.8%)
/I Diseases of the nervous system	5 (8.6%)	5 (5.8%)	5 (8.1%)	8 (7.9%)	7 (7.8%)	12 (13.8%)	7 (7.6%)	http://bmjpaec	3 (4.6%)
C Diseases of the respirato Ty system	8 (13.8%)	23 (26.7%)	15 (24.2%)	22 (21.8%)	30 (33.3%)	20 (23.0%)	10 (10.9%)	ownloaded from http://bmjpaedsopen.bmj.com/         6 (9.4%)           6 (9.4%)         6 (9.4%)	12 (18.5%)
(I Diseases of the digestive system	8 (13.8%)	6 (7.0%)	2 (3.2%)	5 (5.0%)	7 (7.8%)	5 (5.7%)	11 (12.0%)	April 19, 2024	11 (16.9%)
CII Diseases of the skin and subcuta neous issue	10 (17.2%)	6 (7.0%)	9 (14.5%)	9 (8.9%)	7 (7.8%)	4 (4.6%)	10 (10.9%)	6 (9.4%) 6 (9.4%) 2 (3.1%)	3 (4.6%)
(IV Diseases of the genitouri	0 (0.0%)	2 (2.3%)	0 (0.0%)	2 (2.0%)	1 (1.1%)	3 (3.4%)	4 (4.3%)	2 (3.1%) copyright	1 (1.5%)

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#### **BMJ** Paediatrics Open

Page 29 of 28					BMJ Paed	liatrics Open		0-2020-000801		
nary system								000801		
XVIII Sympto ms, signs and abnorma I clinical and I aborato ry findings, not elsewhe 5 re		4 (4.7%)	2 (3.2%)	3 (3.0%)	7 (7.8%)	1 (1.1%)	3 (3.3%)	on 22 September 2020. Downloaded from http	0 (0.0%)	2 (3.1%)
6 Classifie 7 d 8 XIX 9 Injury, 9 poisonin 9 g and 2 certain 2 certain 2 consequ 9 ences of 9 external 2 causes	15 (25.9%)	16 (18.6%)	13 (21.0%)	30 (29.7%)	12 (13.3%)	25 (28.7%)	23 (25.0%)	http://bmjpaedsopen.bmj.com/ on	16 (25.0%)	23 (35.4%)
28 Other	2 (3.4%)	9 (10.5%)	9 (14.5%)	7 (6.9%)	8 (8.9%)	6 (6.9%)	4 (4.3%)	April	4 (6.3%)	3 (4.6%)
29       30       31       32       33       34       35       36       37       38       39       40       11       42	58 (100%)	86 (100%)	62 (100%)	101 (100%)	90 (100%)	87 (100%)	92 (100%)	19, 2024 by guest. Protected by copyright.	64 (100%)	65 (100%)
13				http	s•//mc manuscr	intcentral con	m/hmino	• ·		

# **BMJ** Paediatrics Open

#### Cross-sectional study of paediatric case mix presenting to an emergency centre in Cape Town, South Africa during COVID-19

Journal:	BMJ Paediatrics Open
Manuscript ID	bmjpo-2020-000801.R2
Article Type:	Original research
Date Submitted by the Author:	08-Sep-2020
Complete List of Authors:	Akuaake, Lembi; Stellenbosch University Faculty of Medicine and Health Sciences, Division of Emergency Medicine Hendrikse, Clint; University of Cape Town, Division of Emergency Medicine; Mitchells Plain Hospital and Heideveld Hospital, Emergency Centre Spittal, Graeme; Mitchells Plain Hospital, Paediatric Department Evans, Katya; Mitchells Plain Hospital and Heideveld Hospital, Emergency Centre; University of Cape Town, Division of Emergency Medicine van Hoving, Daniël; Stellenbosch University Faculty of Medicine and Health Sciences, Division of Emergency Medicine
Keywords:	Epidemiology, Health services research





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o Review On

# **Cross-sectional study of paediatric case mix presenting to an emergency centre in Cape Town, South Africa during COVID-19**

<sup>1</sup>Lembi Magano Akuaake, <sup>2,3</sup>Clint Hendrikse, <sup>4</sup>Graeme Spittal, <sup>2,3</sup>Katya Evans, <sup>1</sup>Daniël Jacobus van Hoving

<sup>1</sup>Division of Emergency Medicine, Stellenbosch University, Cape Town, South Africa
 <sup>2</sup>Mitchells Plain Hospital and Heideveld Hospital Emergency Centres, Cape Town, South Africa
 <sup>3</sup>Division of Emergency Medicine, University of Cape Town, Cape Town, South Africa
 <sup>4</sup>Paediatric Department, Mitchells Plain Hospital, Cape Town, South Africa

Corresponding author: Daniël J. van Hoving

Division of Emergency Medicine, Stellenbosch University

PO Box 241

Cape Town, 8000

nvhoving@sun.ac.za

Number of tables: 4

Number of figures: 1

Word count: 2744

### ABSTRACT

#### Objective

To describe and compare the effect of level 5 lockdown measures on the workload and case mix of paediatric patients presenting to a district-level emergency centre in Cape Town, South Africa.

#### Methods

Paediatric patients (<13 years) presenting to Mitchells Plain Hospital were included. The level 5 lockdown period (27/03/2020 - 30/04/2020) was compared to similar 5-week periods immediately before (21/02/2020 - 26/03/2020) and after the lockdown (01/05/2020 - 04/06/2020), and to similar time periods during 2018 and 2019. Patient demographics, characteristics, ICD-10 (International Statistical Classification of Diseases and Related Health Problems 10th Revision) diagnosis, disposition and process times were collected from an electronic patient tracking and registration database. The Chi-square test and the independent samples median test were used for comparisons.

#### Results

Emergency centre visits during the lockdown period (n=592) decreased by 58% compared to 2019 (n=1413) and by 56% compared to the 2020 pre-lockdown period (n=1342). The proportion of under 1 year olds increased by 10.4% (p<0.001), with a 7.4% increase in self-referrals (p<0.001) and a 6.9% reduction in referrals from clinics (p<0.001). Proportionally more children were referred to inpatient disciplines (5.6%, p=0.001) and to a higher level of care (3.9%, p=0.004). Significant reductions occurred in respiratory diseases (66.9%, p<0.001), injuries (36.1%, p<0.001), and infectious diseases (34.1%, p<0.001). All process times were significantly different between the various study periods.

#### Conclusion

Significantly less children presented to the emergency centre since the implementation of the COVID-19 lockdown, with marked reductions in respiratory and infectious-related diseases and in injuries.

### **KEYWORDS**

COVID-19, emergency centre, case mix, paediatric

### INTRODUCTION

Paediatric emergency care decreases childhood morbidity and mortality, but an epidemic has the potential to disrupt access to care and essential child health services.[1–3]

The corona virus disease (COVID-19) was declared a global pandemic by the World Health Organization (WHO) on 11 March 2020 and is caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).[4] The pandemic resulted in most countries implementing social distancing measures to curb the spread of the disease. The South African government implemented a national lockdown on 27 March 2020, consisting of five levels.[5] Level 5 is the most restrictive with only essential services permitted to operate and strict limitations on public transport services with regards to capacity and operating times. The sale of alcohol and tobacco is prohibited as well as any form of exercise in public spaces. Lower levels are a stepwise easing of the restrictions imposed on level 5 in varying degrees to attempt to limit community transmission and resurgence of the virus, while allowing for economic recovery. Level 1 allows for near normal activity to resume but with the recommended public health guidelines to be followed at all times, including wearing a facemask, maintaining social distancing of at least 2 meters and frequently washing or sanitising hands. The South African lockdown started at level 5, which lasted five weeks (27 March – 30 April 2020) and was followed by level 4 (1 May – 31 May 2020). Level 3 restrictions were implemented on 1 June 2020 and was still in place at the time of data collection.

The implemented lockdown measures under level 5 resulted in all non-urgent healthcare appointments being cancelled, including the de-escalation of services at community healthcare centres and the rescheduling of elective surgeries and outpatient department visits at hospital level. An upsurge in patients visiting the emergency centre was anticipated as most other healthcare services were de-escalated. Furthermore, the pandemic and subsequent lockdown periods coincided with autumn and the beginning of winter where an increase in respiratory-related cases are typically experienced, especially in the paediatric population. On the other hand, the effect of the closing of early childhood development centres and schools, as well as most parents forced to work from home, are unknown but could also change the number and type of presentations to the emergency centre.

Previous studies presented conflicting results of health care utilisation during an epidemic. An increase in paediatric patients presenting to emergency centres was seen during the swine flu (H1N1pdm09 virus) pandemic in 2009.[6–8] However, paediatric-related presentations decreased by up to 40% during the 2015 Middle East respiratory syndrome (MERS) epidemic in Korea.[9,10] A more pronounced decrease (80%) was witnessed during the 2003 Severe Acute Respiratory Syndrome (SARS) epidemic in Taiwan.[11] A decline in trauma cases presenting to emergency centres across South Africa has already been noticed,[12] but the effect of the national lockdown on paediatric presentations remains unclear. The aim of the study was to describe and compare the effect of the level 5 national COVID-19 lockdown measures on the workload and case mix of paediatric patients presenting to a district-level emergency centre in Cape Town, South Africa.

#### **METHODS**

#### Study design

A descriptive analysis was conducted on existing data. Data was extracted from an existing database that collects routine data prospectively (in real time).

#### Study setting

Mitchells Plain Hospital is a 365-bed hospital providing district hospital health services to the surrounding community. It serves a low- to middle-income health district of approximately 600 000 people.[13,14] The health district has many social challenges, including gangsterism, crime, and drug abuse. Interpersonal violence and other injuries are particularly prevalent during weekends.[15] Mitchells Plain Hospital is situated on the outskirts of Cape Town and has an emergency centre which manages around 4 100 patients per month; 950 being children under the age of 13 years. A quarter of the children are deemed very urgent or emergent at presentation (orange or red according to the South African Triage Scale)[16] and an average of 135 are admitted to the inpatient paediatric service. Monthly paediatric presentations increase to around 1 200 during the annual respiratory surge season (March -June), of which about 190 are admitted. Normally, the paediatric department assist with providing staff for the emergency centre and non-specialist physicians from the paediatric department have been the treating clinician for around 40% of acute paediatric presentations. Since the lockdown measures came in to effect, the paediatric department has been responsible for over 90% of acute paediatric presentations to free up emergency centre staff to assist with the adult workload. This was made possible by closing the paediatric out patient department and reverting to telephonic consultations that needed less staff.

An electronic patient tracking and registration database (HECTIS - Hospital and Emergency Centre Tracking Information System) is used to collect routine clinical data for each patient that is managed within the emergency centre.

HECTIS is an official electronic application of the Western Cape Department of Health which follows the flow of patients in an emergency centre from arrival to discharge or admission. It is used by numerous emergency centres to streamline patient processes and capture data related to process times, triage scores, ICD-10 (International Statistical Classification of Diseases and Related Health Problems 10th Revision) diagnoses and dispositions. The database has been built on an Oracle platform and is stored off-site. The database is access controlled and authorised users are granted access and authorisation according to their specific clinical role. A triage nurse will thus have access to different parts of the database than a clinician in the emergency centre.

#### Study participants

Convenience sampling was used to include all patients <13 years of age that presented to the emergency centre of Mitchells Plain Hospital over the study periods. Time periods included the level 5 lockdown period (27 March 2020 till 30 April 2020), a 5-week period immediately before the lockdown (21 February 2020 – 26 March 2020), a 5-week period immediately after the lockdown (01 May 2020 – 04 June 2020) and corresponding periods during 2018 and 2019.

#### Data collection and management

Data were exported from the HECTIS database for the various study periods. Variables included age, gender, mode of transport, type of presentation, triage category, ICD-10 diagnosis, process times, and disposition. The triage category was determined at arrival to the hospital and patients were categorised into emergency (red), very urgent (orange), urgent (yellow), and non-urgent (green) as stipulated by the South African Triage Scale (SATS).[16] Patients' diagnosis was determined from ICD-10 codes documented as the main diagnosis. Disposition refers to where a patient is being discharged from the emergency centre. Patient process times were calculated from electronic timestamps and included time to triage (arrival at emergency centre to time of triage), time to consultation (arrival at emergency centre to time when emergency centre disposition was decided) and time in emergency centre (arrival at emergency centre to time when patient left the emergency centre). Process times of patients that absconded were only included to calculate the time to triage (if a triage time was documented) and were excluded from the other process times.

#### Statistical analysis

Summary statistics were used to describe all variables. Categorical data are summarised using frequency counts and percentages, and are presented as two-way tables or bar charts. Median was used as the measure of central tendency for continuous responses and quartiles as indicators of spread. The relationship between categorical variables was determined with the Chi-square test or the Fisher's Exact test, and process times were compared with the independent samples median test. A 5% significance level was used and data were analysed using SPSS Statistics for Windows, Version 26.0 (IBM Corp. Released 2019. Armonk, NY: IBM Corp.).

#### 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.

### RESULTS

#### **Overall emergency centre visits**

A total of 39 905 emergency centre visits were documented over the study periods, of which 9 983 were younger than 13 years of age (a 15% reduction in all (adult and paediatric) emergency centre visits compared to 2019 was observed, as well as a 35% reduction over the lockdown period).[17] One patient was excluded as the visit only pertained to special investigations; 9 982 were thus analysed. There were 2 464 paediatric emergency centre visits during the 2020 time periods, 1 601 less than in 2019 (n=4065) and 989 less than in 2018 (n=3453). There was a 6.2% (n=78) increase in the actual number of patients seen during the 2020 pre-lockdown period compared to 2019, followed by a 58.1% (n=821) reduction for the level 5 lockdown periods and a 61.8% (n=858) reduction over the post-lockdown periods (Figure 1).

#### **Demographics and characteristics**

The demographics and characteristics of patients whom presented during 2020 are presented in Table 1 (see supplementary table 1 for data pertaining to 2018 and 2019). Significant differences during level 5 lockdown compared to the 2020 pre-lockdown period were seen in patient's age, referral type, triage category and disposition. The proportion of children younger than 1 year increased by 10.4% (p<0.001), with a decrease in the 1 to 5 year group (5.6%, p=0.022) and in patients over the age of 5 years (4.8%, p=0.02). The proportions in the age category changed as lockdown measures were eased; children over 5 years were the only group showing an increase (7.1%, p=0.005). An increase in the proportion of self referrals occurred (7.4%, p<0.001), with a subsequent decrease in referrals from primary healthcare clinics (6.9%, p<0.001) and general practitioners (0.4%, p=0.754). Children presenting during the level 5 lockdown periods were also sicker with a 2% increase in the proportion of emergency (triaged red) cases (p=0.018), although the actual number of patients decreased (n=5). The difference in triage category most likely contributed to the proportional increase of inpatient referrals (5.6%, p=0.001), as well as patients referred for higher level of care (3.9%, p=0.004). This also resulted in a proportional decrease in patients being discharged directly home from the emergency centre (5.6%, p=0.019).

Table 1. Demographics and characteristics of paediatric patients presenting to the emergency centre during the level 5 COVID-19 lockdown period and corresponding 5-week periods immediately before and after the lockdown.

Variables n (%)		21 February – 26 March (Pre- lockdown)	27 March – 30 April (Level 5 lockdown)	01 May – 04 June (Post- lockdown)
Age (year)	<1	243 (18.1%)	169 (28.5%) <sup>a</sup>	116 (21.9%) <sup>b</sup>
	1-5	787 (58.6%)	314 (53%) <sup>a</sup>	279 (52.6%)
	>5	312 (23.2%)	109 (18.4%) <sup>a</sup>	135 (25.5%) <sup>b</sup>
Gender	Female	565 (42.1%)	267 (45.1%)	251 (47.4%)
	Male	777 (57.9%)	325 (54.9%)	279 (52.6%)
Transport method	Self	1115 (83.1%)	489 (82.6%)	476 (89.8%) <sup>b</sup>
	Ambulance	145 (10.8%)	69 (11.7%)	52 (9.8%)
	Police or Fire service	0 (0%)	0 (0%)	0 (0%)
	Unknown	82 (6.1%)	34 (5.7%)	2 (0.4%) <sup>b</sup>
Arrival from	Scene / home	1000 (74.5%)	485 (81.9%) <sup>a,c</sup>	457 (86.2%) <sup>d</sup>
	Other healthcare facility	260 (19.4%)	74 (12.5%) <sup>a,c</sup>	52 (9.8%) <sup>d</sup>
	General Practitioner	81 (6%)	33 (5.6%)	21 (4%) <sup>d</sup>
	Unknown	1 (0.1%)	0 (0%)	0 (0%)
Triage category	Non-urgent (Green)	344 (25.6%)	142 (24%)	172 (32.5%) <sup>b,d</sup>
	Urgent (Yellow)	663 (49.4%)	300 (50.7%)	256 (48.3%)
	Very urgent (Orange)	267 (19.9%)	115 (19.4%)	78 (14.7%) <sup>b,d</sup>
	Emergency (Red)	30 (2.2%)	25 (4.2%) <sup>a</sup>	17 (3.2%)
	Unknown	38 (2.8%)	10 (1.7%)	7 (1.3%)
Disposition	Death	4 (0.3%)	4 (0.7%)	0 (0%)
	Referred to in-hospital disciplines	163 (12.1%) <sup>e</sup>	105 (17.7%) <sup>a</sup>	91 (17.2%) <sup>d</sup>
	Discharged	871 (64.9%)	351 (59.3%) <sup>a,c</sup>	346 (65.3%) <sup>b,d</sup>
	Absconded	160 (11.9%) <sup>e</sup>	33 (5.6%)ª	13 (2.5%) <sup>b,d</sup>
	Transferred to higher level facility	92 (6.9%)	64 (10.8%) <sup>a,c</sup>	65 (12.3%) <sup>d</sup>
	Refer to other	52 (3.9%) <sup>e</sup>	35 (5.9%)	15 (2.8%) <sup>b</sup>

<sup>a</sup> Statistically significant difference (p<0.05) between pre-lockdown period 2020 and level 5 lockdown period 2020 (see supplementary table 2)

<sup>b</sup> Statistically significant difference (p<0.05) between level 5 lockdown period 2020 and post-lockdown period 2020 (see supplementary table 2)

<sup>c</sup> Statistically significant difference (p<0.05) between level 5 lockdown period 2019 and 2020 (see supplementary table 2)

<sup>d</sup> Statistically significant difference (p<0.05) between post-lockdown period 2019 and 2020 (see supplementary table 2)

<sup>e</sup> Statistically significant difference (p<0.05) between pre-lockdown period 2019 and 2020 (see supplementary table 2)

#### **Diagnostic categories**

The top three diagnostic categories during the level 5 lockdown were related to the respiratory system (n=141, 23.8%), injuries and poisonings (n=133, 22.5%), and infectious diseases (n=110, 18.6%). In the different age groups, infectious diseases were most frequent in the under 1 year group (n=52, 30.8%), respiratory-related diseases in the 1-5 year group (n=84, 26.8%), and injury-related presentations in the

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over 5 year group (n=46, 14.6%) (Table 2). The top five diagnostic categories per age group and per time period is presented in Supplementary table 3. The actual number of presentations during the level 5 lockdown decreased in all the diagnostic categories compared to the 2020 pre-lockdown period (Table 3). Significant reductions occurred in respiratory diseases (n=285, 66.9%, p<0.001), injuries (n=75, 36.1%, p<0.001), and infectious and parasitic diseases (n=57, 34.1%, p<0.001). Proportionally, diseases of the respiratory system decreased by 7.9%, infectious-related diseases increased by 6.2%, and injuries increased by 7.0% (Table 3) (see supplementary table 4 for comparisons of 2020 versus 2019 and 2020 versus 2018). The diagnostic categories for all the time periods are presented in supplementary table 5. In admitted patients, actual infectious-related diseases decreased by 40% (n=24) and diseases of the respiratory system by 63% (n=67) during the lockdown period compared to 2019. A 28% (n=14) reduction was seen in actual infectious-related and respiratory-related diseases comparing the 2020 lockdown periods (see supplementary table 6 for the diagnostic categories of admitted patients). In patients transferred to higher level of care, actual infectious-related diseases increased by 91% (n=10) and injuries by 33% (n=4) during the lockdown period compared to 2019. A 30% (n=7) reduction was seen in the actual number of injuries and a 5% (n=1) increase in infectious-related diseases comparing the 2020 lockdown periods (see supplementary table 7 for the diagnostic categories of transferred patients).

Table 2. Top five diagnostic categories per age group presenting to the emergency centre during the level 5 COVID-19 lockdown period.

	All			<1 year			1-5 year			> 5 year	
Rank	ICD-10 Category	N (%)	Rank	ICD-10 Category	n (%)	Rank	ICD-10 Category	n (%)	Rank	ICD-10 Category	n (%)
1	Respiratory system	141 (23.8)	1	Infectious diseases	52 (30.8)	1	Respirator y system	84 (26.8)	1	Injury and poisoning	46 (14.6)
2	Injury and poisoning	133 (22.5)	2	Respiratory system	43 (25.4)	2	Injury and poisoning	79 (25.2)	2	Respirator y system	14 (4.5)
3	Infectious diseases	110 (18.6)	3	Findings, not elsewhere classified	13 (7.7)	3	Infectious diseases	47 (15.0)	3	Infectious diseases	11 (3.5)
4	Nervous system	30 (5.1)	4	Skin and subcutaneous tissue	11 (6.5)	4	Nervous system	16 (5.1)	4	Nervous system	10 (3.2)
5	Skin and subcutaneou s tissue	26 (4.4)	5	Injury and poisoning	8 (4.7)	5	Ear and mastoid process	14 (4.5)	5	Digestive system	5 (1.6)

ICD-10: International Statistical Classification of Diseases and Related Health Problems, 10th revision

21 February - 26 March (Pre-lockdown) vs 27 27 March - 30 April (Level 5 lockdown) vs 01 March – 30 April (Level 5 lockdown) May - 04 June (Post-lockdown) ICD-10 category Actual Proportional Actual Proportional p р n (%) n (%) -57 (-34.1) 6.2% <0.001 -40 (-36.4) -5.4% 0.015 I Certain infectious and parasitic diseases -12 (-28.6) 2.0% 0.050 -14 (-46.7) -2.1% 0.097 VI Diseases of the nervous system -8 (-36.4) -1.1% -43 (-66.2) -1.1% 0.287 0.316 VIII Diseases of the ear and mastoid process -285 (-66.9) -7.9% <0.001 -7 (-5.0) 1.5% 0.579 X Diseases of the respiratory system XI Diseases of the digestive system -17 (-60.7) -0.2% 0.861 13 (118.2) 2.6% 0.015 XII Diseases of the skin and -23 (-46.9) 0.7% 0.445 -2 (-7.7) 0.1% 1.000 subcutaneous tissue -26 (-65.0) -0.6% 0.462 -2 (-14.3) -0.1% 1.000 XIV Diseases of the genitourinary system 0.046 XVIII Symptoms, signs and abnormal -64 (-71.9) -2.4% 6 (24.0) 1.6% 0.220 clinical and laboratory findings, not elsewhere classified XIX Injury, poisoning and certain -75 (-36.1) 7.0% <0.001 20 (15.0) 6.4% 0.016 other consequences of external causes

Table 3. Actual and proportional differences of paediatric presentations to the emergency centre during the level 5 lockdown period, compared to similar 5-week periods before and after.

#### **Process times**

All process times were significantly different between the various study periods (Table 4). Comparing median times between the level 5 lockdown period and the 2020 pre-lockdown period, time to triage decreased by 7 minutes (p<0.001), time to consultation by 91 minutes (p<0.001), time to deciding disposition by 76 minutes (p<0.001), and length of stay within the emergency centre by 41 minutes (p=0.003).

Table 4. Process times for paediatric patients (n=9308) presenting to the emergency centre during the 5-week COVID-19 level 5 lockdown period and corresponding periods for three years prior to the lockdown.

		2018			2019			2020		р
Process times (minutes), median(Q1-Q3)* [maximum]	21 February – 26 March	27 March – 30 April	01 May – 04 June	21 February – 26 March	27 March – 30 April	01 May – 04 June	21 February – 26 March (Pre- lockdown)	27 March - 30 April (Level 5 lockdown)	01 May – 04 June (Post- lockdown)	
Time to triage	12 (5-31)	15 (4-39)	20 (7-47)	19 (6-47)	22 (7-52)	16 (5-43)	19 (6-49)	12 (4-33)	14 (5-34)	< 0.001
	[581]	[803]	[460]	[612]	[565]	[368]	[665]	[308]	[1461]	
Time to consultation	81 (45-	95 (54-	104 (59-	107 (61-	119 (66-	118 (65-	140 (71-	49 (42-	59 (29-	< 0.001
	132)	159) [905]	171)	187) [654]	214) [742]	208) [685]	235) [872]	122) [590]	101)	
	[1067]		[1222]						[1054]	
Time to disposition decision	146 (94-	157 (99-	160 (106-	190 (121-	193 (121-	191 (112-	245 (156-	169 (95-	123 (70-	< 0.001
	216)	242)	246)	295)	314)	291)	365)	267)	204)	
	[1437]	[1146]	[1291]	[1521]	[1506]	[1026]	[3337]	[1918]	[1773]	
Time in emergency centre	188 (126-	205 (129-	207 (130-	274 (165-	262 (146-	251 (142-	311 (200-	270 (153-	164 (85-	< 0.001
	278)	320)	330)	495)	428)	411)	492)	459)	423)	
	[1438]	[1797]	[3800]	[2043]	[1717]	[2632]	[3353]	[2349]	[1984]	

\*Q1-Q3: 25th to 75th percentile

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### DISCUSSION

The volume of children visiting the emergency centre during and after the level 5 lockdown period was significantly lower than similar previous time periods. Significant reductions in the number of presentations were seen in respiratory diseases, infectious diseases and injuries (Table 3). A reduction in the proportion of diseases related to the respiratory system occurred in all age groups, while infectious diseases increased in younger patients (<1 year) and injuries increased in children older than one year.

The overall reduction in paediatric emergency centre visits is similar to experiences from the SARS and MERS pandemics, as people tend to avoid or delay attending hospitals due to the fear of contracting the communicable disease.[9–11] Anecdotal evidence do suggest that attendance to the primary healthcare services also decreased. This is of concern and child health needs to be monitored closely over the coming 12 months. The likely reduction in immunisations, specifically measles, could result in outbreaks of non-COVID-19 communicable diseases causing more morbidity and mortality.[3] The impact of this would be substantially worse in impoverished communities.

The reduction in respiratory and infectious-related diseases were substantial contributors to the overall reduction in emergency centre attendance, although the proportion of children with infectious diseases increased. These reductions are most likely multifactorial, and one important consideration could be the closing of early childhood development centres. It has been well documented that children attending crèches have a higher incidence of infectious diseases, including respiratory tract infections.[18,19] About three quarters of paediatric emergency centre attendees at Mitchells Plain Hospital are children under the age of 5 years, of whom a large proportion will normally be in formal or informal crèches while their parents work. The lockdown measures forced most parents to stay at home, thereby further reducing children's exposure to infections (COVID-19 and other) as trips to shops or work were limited.

Children presenting with injuries and poisoning decreased by a third during the level 5 lockdown period, but increased proportionally by 7% (Table 3). This was not expected and could be from children bypassing the community healthcare centres; thus children with minor injuries also presented to the hospital. On the other hand, the home is one of the most dangerous places for children. It is estimated that around 90% of unintentional injuries in young children occur in or around their home when they are supposedly being supervised by a caregiver.[20] Injury risk could also have increased if children became bored at home, while parents were most likely frustrated in the constant supervision of the children. Furthermore, anecdotal evidence suggest that the number of child abuse cases did not decrease during the lockdown periods and remain on a similar trend than before.[21] Another possible reason is the longstanding problem in South Africa where many children are looking after themselves and other children, with an understandable lack of adequate supervision.

The main strength of the study is the use of a comprehensive database that is completed in real time. Although data are not cross-checked, we expect the data to be adequately reflecting the truth. However, care should be taken to generalise the results of the study to other healthcare facilities as it reflects a single centre in a fairly distinctive setting. Diseases were categorised according to diagnostic codes (ICD-10) assigned by attending physicians. A diagnostic code was not assigned to around 10% of patients. We also did not validate whether the correct diagnosis were made, neither did we attempt to ensure that the correct diagnostic code were assigned to the diagnosis. This could have resulted in non-systematic error.

### CONCLUSION

Significantly less children presented to the emergency centre since the implementation of the national COVID-19 level 5 lockdown. The closure of early childhood development centres and schools, together with the restriction of movement of children and their caregivers, markedly reduced the infectious and respiratory-related component of paediatric attendees. The burden of injuries in resource-limited societies remains a problem, even during a period of national lockdown. However, the change in paediatric presentations to the emergency centre across all COVID-19 lockdown levels remains unknown and should be investigated in future. uld be investigation

# CONTRIBUTIONS

DJvH and CH conceived the study. MA, CH, and KE undertook data collection. MA and DJvH cleaned the data, and DJvH and CH did the data analyses. MA drafted the manuscript and the remaining authors critiqued the paper for important intellectual content. All authors read and approved the final version of the manuscript. MA is the guarantor.

# FUNDING

The study was self-funded.

# **COMPETING INTERESTS**

None declared.

# ETHICS APPROVAL

The study was approved by the Health Research Ethics Committee of Stellenbosch University (Ref: N20/04/009\_COVID-19) and included a waiver of informed consent.

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# WHAT IS ALREADY KNOWN ON THIS TOPIC

- \_ The volume of children attending emergency centres varied during previous epidemics
- Paediatric emergency centre attendances decreased during COVID-19 \_

# WHAT THIS STUDY ADDS

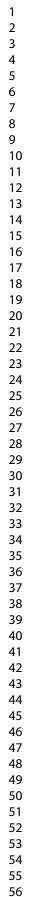
- Significantly less children presented to the emergency centre since the implementation of national COVID-19 level 5 lockdown
- <text><text><text> A greater proportion, but smaller numbers of younger and sicker children attended the emergency centre during the COVID-19 lockdown
- Marked reductions occurred in respiratory diseases, infectious-related diseases, and in injuries -
- The proportion of infectious diseases increased in patients <1 year, while injuries increased in older children

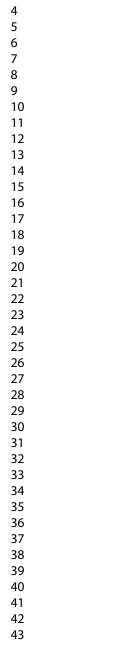
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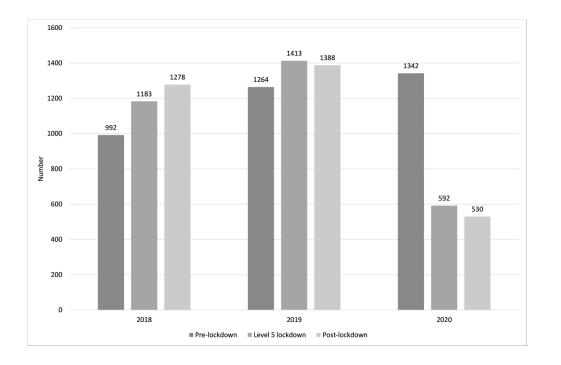
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 Supplementary table 1. Demographics and characteristics of paediatric patients presenting to the emergency centre during the level 5 COVID-19 lockdown period and corresponding 5-week periods immediately before and after the lockdown and for two previous years.

			2018			2019			2020	
Variables n (%)		21 Feb – 26 Mar	27 Mar – 30 Apr	01 May – 04 Jun	21 Feb – 26 Mar	27 Mar – 30 Apr	01 May – 04 Jun	21 Feb – 26 Mar (Pre- lockdown)	27 Mar – 30 Apr (Level 5 lockdown)	01 May - 04 Jun (Post- lockdown
Age (year)	<1	210	372	368	249	351	312	243	169	11
		(21.2%)	(31.4%)	(28.8%)	(19.7%)	(24.8%)	(22.5%)	(18.1%)	(28.5%) <sup>a</sup>	(21.9%
	1-5	528 (53.2%)	592 (50%)	677 (53%)	717 (56.7%)	766 (54.2%)	742 (53.5%)	787 (58.6%)	314 (53%) <sup>a</sup>	27 (52.69
	>5	254	219	233	298	296	334	312	109	13
		(25.6%)	(18.5%)	(18.2%)	(23.6%)	(20.9%)	(24.1%)	(23.2%)	(18.4%) <sup>a</sup>	(25.5%
Gender	Female	436 (44%)	509 (43%)	588 (46%)	537	609	610	565	267	25
	Male	556 (56%)	674 (57%)	690 (54%)	(42.5%)	(43.1%) 804	(43.9%) 778	(42.1%)	(45.1%) 325	(47.49
	Wale	550 (50%)	074 (37%)	090 (34%)	(57.5%)	(56.9%)	(56.1%)	(57.9%)	(54.9%)	(52.69
Transport	Self	785	920	1082	1025	1171	1267	1115	489	47
method		(79.1%)	(77.8%)	(84.7%)	(81.1%)	(82.9%)	(91.3%)	(83.1%)	(82.6%)	(89.8%
	Ambulance	130	178 (15%)	193	152 (12%)	133 (9.4%)	120 (8.6%)	145	69 (11.7%)	52 (9.89
	Police or Fire service	(13.1%) 2 (0.2%)	1 (0.1%)	(15.1%) 1 (0.1%)	2 (0.2%)	4 (0.3%)	1 (0.1%)	(10.8%) 0 (0%)	0 (0%)	0 (09
	Folice of The Service	2 (0.278)	1 (0.176)	1 (0.176)	2 (0.270)	4 (0.376)	1 (0.170)	0 (076)	0 (078)	0 (0/
	Unknown	75 (7.6%)	84 (7.1%)	2 (0.2%)	85 (6.7%)	105 (7.4%)	0 (0%)	82 (6.1%)	34 (5.7%)	2 (0.4%
Arrival from	Scene / home	658	835	907 (71%)	931	1069	1067	1000	485	4
		(66.3%)	(70.6%)		(73.7%)	(75.7%)	(76.9%)	(74.5%)	(81.9%) <sup>a,c</sup>	(86.2%
	Other healthcare facility	262 (26.4%)	266 (22.5%)	285 (22.3%)	250 (19.8%)	242 (17.1%)	220 (15.9%)	260 (19.4%)	74 (12.5%) <sup>a,c</sup>	52 (9.8%
	General Practitioner	72 (7.3%)	82 (6.9%)	86 (6.7%)	83 (6.6%)	99 (7%)	101 (7.3%)	81 (6%)	33 (5.6%)	21 (4%
	Unknown	0 (0%)	0 (0%)	0 (0%)	0 (0%)	3 (0.2%)	0 (0%)	1 (0.1%)	0 (0%)	0 (09
Triage	Non-urgent (Green)	238 (24%)	202	202	311	287	241	344	142 (24%)	17
category	-		(17.1%)	(15.8%)	(24.6%)	(20.3%)	(17.4%)	(25.6%)		(32.5%)
	Urgent (Yellow)	516 (52%)	622 (52.6%)	760 (59.5%)	639 (50.6%)	758 (53.6%)	733 (52.8%)	663 (49.4%)	300 (50.7%)	25 (48.39
	Very urgent (Orange)	181	(52.6%)	255 (20%)	(50.6%)	(55.6%)	(52.8%) 351	(49.4%)	(50.7%)	(46.57
	very algene (orange)	(18.2%)	(24.2%)	200 (20/0)	(19.5%)	(20.8%)	(25.3%)	(19.9%)	(19.4%)	(14.7%)
	Emergency (Red)	33 (3.3%)	41 (3.5%)	35 (2.7%)	39 (3.1%)	40 (2.8%)	35 (2.5%)	30 (2.2%)	25 (4.2%) <sup>a</sup>	17 (3.25
	Unknown	24 (2.4%)	32 (2.7%)	26 (2%)	29 (2.3%)	34 (2.4%)	28 (2%)	38 (2.8%)	10 (1.7%)	7 (1.39
Disposition	Death	2 (0.2%)	0 (0%)	1 (0.1%)	1 (0.1%)	4 (0.3%)	3 (0.2%)	4 (0.3%)	4 (0.7%)	0 (09
	Referred to in-hospital disciplines	193 (19.5%)	251 (21.2%)	293 (22.9%)	210 (16.6%)	209 (14.8%)	159 (11.5%)	163 (12.1%) <sup>e</sup>	105 (17.7%)ª	(17.2%
	uscipilites	(13.370)	(21.270)	(22.3%)	(10.0%)	(14.0%)	(11.3%)	(12.1/0)	(17.770)	(17.27
	Discharged	674	770	817	862	946	983	871	351	34
		(67.9%)	(65.1%)	(63.9%)	(68.2%)	(66.9%)	(70.8%)	(64.9%)	(59.3%) <sup>a,c</sup>	(65.3%) <sup>i</sup>
	Absconded	28 (2.8%)	42 (3.6%)	58 (4.5%)	66 (5.2%)	99 (7%)	92 (6.6%)	160 (11.9%) <sup>e</sup>	33 (5.6%) <sup>a</sup>	(2.5%)
	Transferred to higher level facility	58 (5.8%)	86 (7.3%)	62 (4.9%)	101 (8%)	90 (6.4%)	87 (6.3%)	92 (6.9%)	64 (10.8%) <sup>a,c</sup>	(12.3%
	Refer to other	37 (3.7%)	34 (2.9%)	47 (3.7%)	24 (1.9%)	65 (4.6%)	64 (4.6%)	52 (3.9%) <sup>e</sup>	35 (5.9%)	15 (2.8%

<sup>a</sup> Statistically significant difference (p<0.05) between pre-lockdown period 2020 and level 5 lockdown period 2020 (see supplementary table 2)

<sup>b</sup> Statistically significant difference (p<0.05) between level 5 lockdown period 2020 and post-lockdown period 2020 (see supplementary table 2)

<sup>c</sup> Statistically significant difference (p<0.05) between level 5 lockdown period 2019 and 2020 (see supplementary table 2)

<sup>d</sup> Statistically significant difference (p<0.05) between post-lockdown period 2019 and 2020 (see supplementary table 2)

 $^{\rm e}$  Statistically significant difference (p<0.05) between pre-lockdown period 2019 and 2020 (see supplementary table 2)

Supplementary table 2. Differences between different study periods of demographic and clinical characteristics of paediatric patients presenting to the emergency centre

			2020 vs 2	2019				202	0	
	21 Feb – 26	5 Mar	27 Mar – 3	0 Apr	01 May – (	)4 Jun	Pre-lockdown lockdov		Level 5 lock Post-lock	
Variables	n (%)	р	n (%)	р	n (%)	р	n (%)	р	n (%)	р
n (%) Age (year)										
<1	-6 (-2.4)	0.317	-182 (-51.9)	0.094	-196 (-62.8)	0.806	-74 (-30.5)	<0.001	-53 (-31.4)	0.011
1-5	70 (9.7)	0.322	-452 (-59.0)	0.659	-463 (-62.4)	0.759	-473 (-60.1)	0.022	-35 (-11.1)	0.905
>5	14 (4.)	0.853	-187 (-63.2)	0.201	-199 (-59.6)	0.553	-203 (-65.1)	0.020	26 (23.9)	0.005
Gender							,,		- ( /	
Female	28 (5.2)	0.874	-342 (-56.2)	0.430	-359 (-58.9)	0.182	-298 (-52.7)	0.232	-16 (-6.0)	0.472
Male	50 (6.9)	0.000	-479 (-59.6)		-499 (-64.1)	0.000	-452 (-58.2)	0.000	-46 (-14.2)	0.000
Transport method									- ( )	
Self	90 (8.8)	0.201	-682 (-58.2)	0.897	-791 (-62.4)	0.330	-626 (-56.1)	0.844	-13 (-2.7)	0.001
Ambulance	-7 (-4.6)	0.355	-64 (-48.1)	0.143	-68 (-56.7)	0.475	-76 (-52.4)	0.637	-17 (-24.6)	0.336
Police or Fire service	-2 (-100)	0.235	-4 (-100)	0.326	-1 (-100)	1.000	0 (0)		0 (0)	
Unknown	-3 (-3.5)	0.575	-71 (-67.6)	0.179	2 (200)	0.076	-48 (-58.5)	0.758	-32 (-94.1)	<0.001
Arrival from	· · ·									
Scene / home	69 (7.4)	0.623	-584 (-54.6)	0.002	-610 (-57.2)	<0.001	-515 (-51.5)	<0.001	-28 (-5.8)	0.051
Other healthcare facility	10 (4)	0.805	-168 (-69.4)	0.011	-168 (-76.4)	0.001	-186 (-71.5)	<0.001	-22 (-29.7)	0.157
General Practitioner	-2 (-2.4)	0.628	-66 (-66.7)	0.277	-80 (-79.2)	0.009	-48 (-59.3)	0.754	-12 (-36.4)	0.213
Unknown	1 (100)	1.000	-3 (-100)	0.560	0 (0)		-1 (-100)	1.000	0 (0)	
Triage category										
Non-urgent (Green)	33 (10.6)	0.557	-145 (-50.5)	0.073	-69 (-28.6)	<0.001	-202 (-58.2)	0.460	-30 (-14.2)	0.002
Urgent (Yellow)	24 (3.7)	0.292	-458 (-60.4)	0.239	-477 (-65.1)	0.082	-363 (-58.7)	0.622	-44 (-21.1)	0.437
Very urgent (Orange)	21 (8.5)	0.805	-179 (-60.9)	0.504	-273 (-77.8)	<0.001	-152 (-54.8)	0.853	-37 (-14.7)	0.039
Emergency (Red)	-9 (-23.1)	0.182	-15 (-37.5)	0.128	-18 (-51.4)	0.432	-5 (-56.9)	0.018	-8 (-32.2)	0.432
Unknown	9 (31.0)	0.458	-24 (-70.6)	0.404	-21 (-75)	0.347	-28 (-73.7)	0.155	-3 (-30)	0.636
Disposition										
Referred to in- hospital disciplines	3 (300)	0.376	0 (0)	0.246	-3 (-100)	0.565	0 (0)	0.258	-4 (-100)	0.127
Discharged	-47 (-22.4)	0.001	-104 (-49.8)	0.106	-68 (-42.8)	0.001	-58 (-35.6)	0.001	-14 (-13.3)	0.814
Absconded	9 (1.0)	0.081	-595 (-62.9)	0.001	-637 (-64.8)	0.020	-520 (-59.7)	0.019	-5 (-1.4)	0.042
Transferred to higher level facility	94 (142.4)	0.001	-66 (-66.7)	0.277	-79 (-85.9)	0.001	-127 (-79.4)	0.001	-20 (-60.6)	0.010
Refer to other	-9 (-8.9)	0.295	-26 (-28.9)	0.001	-22 (-25.3)	< 0.001	-28 (-30.4)	0.004	1 (1.6)	0.455
Referred to in- hospital disciplines	28 (116.7)	0.003	-30 (-46. 2)	0.260	-49 (-76.6)	0.094	-17 (-32.7)	0.056	-20 (-57.1)	0.014
spine and prince		2.500				2.00 .	=: ( =:)	2.000		5.514

Pre-lockdown period: 21 February – 26 March; Lockdown period: 27 March – 30 April; Post-lockdown period: 01 May – 04 June

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Supplementary table 3. Top five diagnostic categories per age group presenting to the emergency centre during the level 5 COVID-19 lockdown period and similar time periods.

27 March – 30 April	2019	21 February – 26 Mar (Pre-lockdown		27 March – 30 April (level 5 lockdow		01 May – 04 June 202 lockdown)	0 (Post-
ICD-10 Category	n (%)	ICD-10 Category	n (%)	ICD-10 Category	n (%)	ICD-10 Category	n (%)
All							
Respiratory system	442 (35.0)	Respiratory system	426 (31.7)	Respiratory system	141 (23.8)	Injury and poisoning	153 (28.9
Infectious diseases	247 (19.5)	Injury and poisoning	208 (15.5)	Injury and poisoning	133 (22.5)	Respiratory system	134 (25.3
Injury and poisoning	209 (16.5)	Infectious diseases	167 (12.4)	Infectious diseases	110 (18.6)	Infectious diseases	70 (13.2
Findings, not elsewhere classified	51 (4.0)	Findings, not elsewhere classified	89 (6.6)	Nervous system	30 (5.1)	Findings, not elsewhere classified	3: (5.8
Nervous system	(4.0) 49 (3.9)	Ear and mastoid process	(0.0) 65 (4.8)	Skin and subcutaneous tissue	(3.1) 26 (4.4)	Digestive system	(3.8 24 (4.5
						Skin and subcutaneous tissue	24 (4.5
<1 year							
Respiratory system	200 (57.0)	Respiratory system	78 (32.1)	Infectious diseases	52 (30.8)	Infectious diseases	3: (28.4
Infectious diseases	65 (18.5)	Infectious diseases	61 (25.1)	Respiratory system	43 (25.4)	Respiratory system	2 (25.0
Findings, not elsewhere classified	11 (3.1)	Findings, not elsewhere classified	20 (8.2)	Findings, not elsewhere classified	13 (7.7)	Injury and poisoning	1 (11.2
Injury and poisoning	10 (2.8)	Injury and poisoning	18 (7.4)	Skin and subcutaneous tissue	11 (6.5)	Skin and subcutaneous tissue	9 (7.8
Skin and subcutaneous tissue	7 (2.0)	Skin and subcutaneous tissue	10 (4.1)	Injury and poisoning	8 (4.7)	Digestive system	6 (5.2
Ear and mastoid process	7 (2.0)						
1-5 year							
Respiratory system	294 (38.4)	Respiratory system	284 (36.1)	Respiratory system	84 (26.8)	Injury and poisoning	9 (33.3
Infectious diseases	125 (16.3)	Injury and poisoning	108 (13.7)	Injury and poisoning	79 (25.2)	Respiratory system	7 (28.3
Injury and poisoning	78 (10.2)	Infectious diseases	91 (11.6)	Infectious diseases	47 (15.0)	Infectious diseases	2 (8.2
Ear and mastoid process	50 (6.5)	Ear and mastoid process	51 (6.5)	Nervous system	16 (5.1)	Findings, not elsewhere classified	2 (7.2
Findings, not elsewhere classified	32 (4.2)	Findings, not elsewhere classified	36 (4.6)	Ear and mastoid process	14 (4.5)	Ear and mastoid process	1 (4.3
> 5 year							
Respiratory system	58 (7.6)	Injury and poisoning	82 (10.4)	Injury and poisoning	46 (14.6)	Injury and poisoning	4 (16.8
Injury and poisoning	57 (7.4)	Respiratory system	64 (8.1)	Respiratory system	14 (4.5)	Respiratory system	2 (9.3
Infectious diseases	38 (5.0)	Findings, not elsewhere classified	33 (4.2)	Infectious diseases	11 (3.5)	Infectious diseases	1 (5.0
Findings, not elsewhere classified	27 (3.5)	Nervous system	19 (2.4)	Nervous system	10 (3.2)	Digestive system	1 (4.3
Nervous system	24 (3.1)	Skin and subcutaneous tissue	16 (2.0)	Digestive system	5 (1.6)	Nervous system	7 (2.5
		Genitourinary system	16 (2.0)				

ICD-10: International Statistical Classification of Diseases and Related Health Problems, 10th revision

BMJ Paediatrics Open Sep week periods before and after, compared to the previous two years.

					2020 vs 2018								2	202월	vs 2019				
	21	Feb – 26 Mar ( lockdown)	Pre-	27 N	lar – 30 Apr (Le lockdown)	evel 5	01 N	/lay – 04 Jun (I lockdown)	Post-	21 Feb – 2	6 Mar (Pre-loc	kdown)		r–93,0 lo¢bed	Apr (Levo own)	el 5	01 May – 0	4 Jun (Post-loc	kdowr
ICD-10 category	Actu al n (%)	Proportion al	P	Actu al n (%)	Proportion al	р	Actu al n (%)	Proportion al	р	Actual n (%)	Proportion al	р	Actual n (%)	) <mark>ද</mark> ිව. Do	portion al	р	Actual n (%)	Proportion al	р
I Certain infectious and					10		-155 (-			-80 (- 32.4)	-7.1%	<0.00 1	-118 (- 51.8)	wnloaded	2.5%	0.191	-97 (- 58.1)	1.2%	0.4
parasitic diseases	-53 (- 31.7)	-9.8%	0.574	-97 (- 88.2)	1.1%	0.564	221.4	-4.4%	0.210					d fr					
VI Diseases of the nervous system	21 (50)	1.0%	<0.00 1	14 (46.7	3.7%	<0.00 1	-8 (- 50)	1.1%	0.133	-7 (- 14.3)	-0.8%	0.337	-14 (- 31.8)	from http://b	2.0%	0.038	-23 (- 59.0)	0.2%	0.8
VIII Diseases of the ear and mastoid	40 (61.5	1.0/0		-23 (- 104.5	5.778		-52 (- 371.4			22 (51.2)	1.4%	0.076	-42 (- 65.6)	mjpaedsope	-0.8%	0.469	-50 (- 78.1)	-2.0%	0.0
process	(01.0	2.3%	0.927	)	-0.1%	0.927	)	-2.6%	0.018					pe					
X Diseases of the respiratory system	118 (27.7 )	0.7%	<0.00 1	-359 (- 254.6 )	-18.5%	<0.00 1	-378 (- 282.1 )	-14.8%	<0.00 1	-16 (- 3.6)	-3.3%	0.081	-411 (- 74,5)	n.bmj.com	-15.3%	<0.00 1	-466 (- 77.7)	-17.9%	<0.
XI Diseases of the digestive system	-6 (- 21.4)	-1.3%	0.370	-19 (- 172.7 )	-0.6%	0.370	-3 (- 12.5)	2.4%	0.005	2 (7.7)	0.0%	1.000	-18 (- 62.1)	on April		0.862	1 (4.3)	2.8%	0.0
XII Diseases of the skin and subcutaneo us tissue	-33 (- 67.3)	-4.6%	0.580	-33 (- 126.9 )	-0.6%	0.580	-26 (- 108.3	0.6%	0.547	1 (2.1)	-0.1%	0.819	-20 (- 43.5)	19, 2024 by		0.236	-12 (- 33.3)	1.9%	0.0
XIV Diseases of the	7			, c (			-13 (- 108.3			22 (122.2)	1.6%	0.008	-13 (- 48.5)	guest. Pr	0.5%	0.604	-10 (- 45.5)	0.7%	0.3
genitourina ry system	(17.5 )	-0.3%	0.329	-6 (- 42.9)	0.7%	0.329	108.3	0.3%	0.674					ote					
XVIII Symptoms,	, 39 (43.8			-39 (- 156.0			-27 (-			38 (74.5)	2.6%	0.004	-45 (- 64.3)	Protected by	-0.8%	0.493	-42 (- 57.5)	0.5%	0.6
signs and		1.6%	0.280	)	-1.2%	0.280	87.1)	1.3%	0.241	1				copyright.			1		

Page 23 of 2	25								BMJ	Paediat	rics Open				0-2020-000801 on				
1 2 3 4	abnormal clinical and														22	 			
5 6 7 8	laboratory findings, not elsewhere classified														September 2020.				
9 10 11 12 13 14	XIX Injury, poisoning and certain other consequenc es of external causes	75 (36.1 )	2.1%	<0.00	14 (10.5 )	12.4%	<0.00	59 (38.6 )	21.5%	<0.00 1	-1 (-0.5)	-1.0%	0.487	-12 (-8.3)	_	1	-21 (- 12.1)	16.4%	<0.00 1
15 16 17 18 19 20 21 22 23 24 25									21.5%						m http://bmjpaedsopen.bmj.com/ on April 19, 2024 by guest.				
26 27 28 29 30 31 32 33 34 35 36															est.				
37 38 39 40 41 42 43								httr	os://mc.mar	nuscript	central.cc	om/bmjpo			Protected by copyright.				

Supplementary table 5. Diagnostic categories of paediatric patients presenting to the emergency centre during the level 5 COVID-19 lockdown period and corresponding time periods.

							2020			
ICD-10 Category, n(%)	21 Feb – 26 Mar	27 Mar – 30 Apr	01 May – 04 Jun	21 Feb – 26 Mar	27 Mar – 30 Apr	01 May – 04 Jun	21 Feb – 26 Mar (Pre- lockdow n)	27 Mar – 30 Apr (Level 5 lockdow n)	01 May – 04 Jun (Post- lockdow n)	
Certain infectious and parasitic diseases	220 (22.2%)	207 (17.5%)	225 (17.6%)	247 (19.5%)	228 (16.1%)	167 (12%)	167 (12.4%)	110 (18.6%)	70 (13.2%)	
II Neoplasms	1 (0.1%)	2 (0.2%)	0 (0%)	0 (0%)	3 (0.2%)	2 (0.1%)	0 (0%)	0 (0%)	0 (0%)	
III Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	0 (0%)	0 (0%)	1 (0.1%)	2 (0.2%)	1 (0.1%)	0 (0%)	1 (0.1%)	1 (0.2%)	3 (0.6%)	
V Endocrine, nutritional and metabolic diseases	1 (0.1%)	1 (0.1%)	7 (0.5%)	8 (0.6%)	7 (0.5%)	8 (0.6%)	2 (0.1%)	1 (0.2%)	2 (0.4%)	
V Mental and behavioural disorders	1 (0.1%)	3 (0.3%)	3 (0.2%)	2 (0.2%)	0 (0%)	6 (0.4%)	0 (0%)	2 (0.3%)	0 (0%)	
VI Diseases of the nervous system	21 (2.1%)	16 (1.4%)	24 (1.9%)	49 (3.9%)	44 (3.1%)	39 (2.8%)	42 (3.1%)	30 (5.1%)	16 (3%)	
VII Diseases of the eye and adnexa	6 (0.6%)	4 (0.3%)	8 (0.6%)	10 (0.8%)	11 (0.8%)	14 (1%)	9 (0.7%)	2 (0.3%)	1 (0.2%)	
VIII Diseases of the ear and mastoid process	25 (2.5%)	45 (3.8%)	66 (5.2%)	43 (3.4%)	64 (4.5%)	64 (4.6%)	65 (4.8%)	22 (3.7%)	14 (2.6%)	
IX Diseases of the circulatory system	0 (0%)	0 (0%)	2 (0.2%)	3 (0.2%)	6 (0.4%)	2 (0.1%)	1 (0.1%)	1 (0.2%)	0 (0%)	
X Diseases of the respiratory system	308 (31%)	500 (42.3%)	512 (40.1%)	442 (35%)	552 (39.1%)	600 (43.2%)	426 (31.7%)	141 (23.8%)	134 (25.3%)	
XI Diseases of the digestive system	34 (3.4%)	30 (2.5%)	27 (2.1%)	26 (2.1%)	29 (2.1%)	23 (1.7%)	28 (2.1%)	11 (1.9%)	24 (4.5%)	
XII Diseases of the skin and subcutaneous tissue	82 (8.3%)	59 (5%)	50 (3.9%)	48 (3.8%)	46 (3.3%)	36 (2.6%)	49 (3.7%)	26 (4.4%)	24 (4.5%)	
XII Diseases of the musculoskeletal system and connective tissue	1 (0.1%)	6 (0.5%)	3 (0.2%)	8 (0.6%)	17 (1.2%)	8 (0.6%)	2 (0.1%)	2 (0.3%)	7 (1.3%)	
XIV Diseases of the genitourinary system	33 (3.3%)	20 (1.7%)	25 (2%)	18 (1.4%)	27 (1.9%)	22 (1.6%)	40 (3%)	14 (2.4%)	12 (2.3%)	
XV Pregnancy, childbirth and the puerperium	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (0.2%)	
XVI Certain conditions originating in the perinatal period	0 (0%)	1 (0.1%)	3 (0.2%)	2 (0.2%)	2 (0.1%)	2 (0.1%)	2 (0.1%)	4 (0.7%)	3 (0.6%)	
XVII Congenital malformations, deformations and chromosomal abnormalities	1 (0.1%)	0 (0%)	1 (0.1%)	1 (0.1%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (0.4%)	
XVIII Symptoms, signs and abnormal clinical and aboratory findings, not elsewhere classified	50 (5%)	64 (5.4%)	58 (4.5%)	51 (4%)	70 (5%)	73 (5.3%)	89 (6.6%)	25 (4.2%)	31 (5.8%)	
XIX Injury, poisoning and certain other consequences of external causes	133 (13.4%)	119 (10.1%)	94 (7.4%)	209 (16.5%)	145 (10.3%)	174 (12.5%)	208 (15.5%)	133 (22.5%)	153 (28.9%)	
XX External causes of morbidity and mortality	36 (3.6%)	41 (3.5%)	40 (3.1%)	6 (0.5%)	9 (0.6%)	8 (0.6%)	11 (0.8%)	4 (0.7%)	5 (0.9%)	
XXI Factors influencing health status and contact with health services	6 (0.6%)	10 (0.8%)	14 (1.1%)	14 (1.1%)	9 (0.6%)	2 (0.1%)	15 (1.1%)	8 (1.4%)	7 (1.3%)	
Unknown	33 (3.3%)	55 (4.6%)	115 (9%)	75 (5.9%)	143 (10.1%)	138 (9.9%)	185 (13.8%)	55 (9.3%)	21 (4%)	

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		2018			2019		Sep	2020	
	21 Feb – 26 Mar	27 Mar – 30 Apr	01 May – 04 Jun	21 Feb – 26 Mar	27 Mar – 30 Apr	01 May – 04 Jun	Der 26 Mar 2007 Mar 2007 Pre- 2007 Ockdown)	27 Mar – 30 Apr (Level 5 lockdown)	01 May – 04 Jun (Post- lockdown)
ICD-10 category	n (%)	n (%)	n (%)						
I Certain infectious and parasitic diseases	82 (42.5%)	78 (31.1%)	85 (29.0%)	64 (30.5%)	60 (28.7%)	37 (23.3%)	50 (30.7%)	36 (34.3%)	29 (31.9%)
VI Diseases of the nervous system	9 (4.7%)	8 (3.2%)	8 (2.7%)	28 (13.3%)	19 (9.1%)	12 (7.5%)	de 20 (12.3%)	7 (6.7%)	4 (4.4%)
VIII Diseases of the ear and mastoid process	3 (1.6%)	1 (0.4%)	2 (0.7%)	1 (0.5%)	3 (1.4%)	8 (5.0%)	from 6 (3.7%)	1 (1.0%)	0 (0.0%)
X Diseases of the respiratory system	73 (37.8%)	140 (55.8%)	131 (44.7%)	98 (46.7%)	107 (51.2%)	72 (45.4%)	56 (34.4%)	40 (38.1%)	37 (40.7%)
XI Diseases of the digestive system	2 (1.0%)	1 (0.4%)	1 (0.3%)	1 (0.5%)	0 (0.0%)	2 (1.3%)	2 (1.2%)	2 (1.9%)	0 (0.0%)
XII Diseases of the skin and subcutaneous tissue	7 (3.6%)	4 (1.6%)	1 (0.3%)	1 (0.5%)	3 (1.4%)	1 (0.6%)	6 4 (2.5%)	0 (0.0%)	1 (1.1%)
XIV Diseases of the genitourinary system	4 (2. %)	1 (0.4%)	0 (0.0%)	2 (1.0%)	1 (0.5%)	0 (0.0%)	7 (4.3%)	4 (3.8%)	3 (3.3%)
XVIII Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	10 (5.2%)	14 (5.6%)	15 (5.1%)	9 (4.3%)	6 (2.9%)	14 (8.8%)	on 13 (8.0%) April 19, 20	6 (5.7%)	5 (5.5%)
XIX Injury, poisoning and certain other consequences of external causes	1 (0.5%)	1 (0.4%)	5 (1.7%)	1 (0.5%)	1 (0.5%)	2 (1.3%)	24 3 (1.8%) by guest.	1 (1.0%)	3 (3.3%)
Other	2 (1.0%)	3 (1.2%)	45 (15.4%)	5 (2.4%)	9 (4.3%)	11 (6.9%)	Po 2 (1.2%)	8 (7.6%)	9 (9.9%)
	193 (100%)	251 (100%)	293 (100%)	210 (100%)	209 (100%)	159 (100%)	ଞ୍ଚି 163 (100%)	105 (100%)	91 (100%)

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		2018			2019		pten	2020	
	21 Feb – 26 Mar	27 Mar – 30 Apr	01 May – 04 Jun	21 Feb – 26 Mar	27 Mar – 30 Apr	01 May – 04 Jun	©21 Feb – 26 № Mar (Pre- 20 lockdown)	27 Mar – 30 Apr (Level 5 lockdown)	01 May – 04 Jun (Post- lockdown)
ICD-10 category	n (%)	n (%)	n (%)						
I Certain infectious and parasitic diseases	9 (15.5%)	15 (17.4%)	7 (11.3%)	15 (14.9%)	11 (12.2%)	11 (12.6%)	20 (21.7%)	21 (32.8%)	7 (10.8%)
VI Diseases of the nervous system	5 (8.6%)	5 (5.8%)	5 (8.1%)	8 (7.9%)	7 (7.8%)	12 (13.8%)	ded 7 (7.6%)	6 (9.4%)	3 (4.6%)
X Diseases of the respiratory system	8 (13.8%)	23 (26.7%)	15 (24.2%)	22 (21.8%)	30 (33.3%)	20 (23.0%)	∃ 10 (10.9%)	6 (9.4%)	12 (18.5%)
XI Diseases of the digestive system	8 (13.8%)	6 (7.0%)	2 (3.2%)	5 (5.0%)	7 (7.8%)	5 (5.7%)	11 (12.0%)	3 (4.7%)	11 (16.9%)
XII Diseases of the skin and subcutaneous tissue	10 (17.2%)	6 (7.0%)	9 (14.5%)	9 (8.9%)	7 (7.8%)	4 (4.6%)	a 10 (10.9%)	6 (9.4%)	3 (4.6%)
XIV Diseases of the genitourinary system	0 (0.0%)	2 (2.3%)	0 (0.0%)	2 (2.0%)	1 (1.1%)	3 (3.4%)	4 (4.3%)	2 (3.1%)	1 (1.5%)
XVIII Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	1 (1.7%)	4 (4.7%)	2 (3.2%)	3 (3.0%)	7 (7.8%)	1 (1.1%)	3 (3.3%) .com/ on	0 (0.0%)	2 (3.1%)
XIX Injury, poisoning and certain other consequences of external causes	15 (25.9%)	16 (18.6%)	13 (21.0%)	30 (29.7%)	12 (13.3%)	25 (28.7%)	April 19, 202	16 (25.0%)	23 (35.4%)
Other	2 (3.4%)	9 (10.5%)	9 (14.5%)	7 (6.9%)	8 (8.9%)	6 (6.9%)	4 (4.3%)	4 (6.3%)	3 (4.6%)
	58 (100%)	86 (100%)	62 (100%)	101 (100%)	90 (100%)	87 (100%)	ي بو 92 (100%)	64 (100%)	65 (100%)

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