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The injury-illness dichotomy of COVID-19 on the pediatric ED



Israel spent more days in nationwide lockdown in 2020 than any other country, and is the first country to lockdown three times during this Covid-19 pandemic. The first lockdown, March 14–April 18, covered the Passover holiday. The second, September 18 to October 17, covered the Jewish high holidays. The third, December 27, 2020 to February 7, 2021, coincided with the onset of Israel's mass vaccination drive. There have been numerous school and daycare closures—middle schoolers have had only 2 weeks of in-class activity since the start of the current school year. We write to report a consistent decrease in infectious disease over the pandemic year, with an increase in trauma diagnoses over the second half of the pandemic year, when compared to the average over the last 3 years.

We collected date of visit, patient age, disposition and ICD-9 code at PED discharge for PED visits from February 1 to January 31, 2017–2020 (Appendix 1). We grouped visits into the following categories: respiratory illness (bronchiolitis, cough, wheeze, asthma, respiratory, dyspnea or pneumonia), gastrointestinal illness (gastroenteritis, diarrhea, or vomiting), fracture or dislocation, laceration or open wound, minor injury (injury, contusion, sprain, abrasion or fall), burns, bites, and diagnoses related to head injury.

Overall, there was a decrease of 28% in volume of patients seen from February 1, 2020 to January 31, 2021 compared with the average for that period over the prior 3 years. March, April and May, patient volumes during the pandemic showed decreases of 41%, 50% and 55% respectively from the previous 3 year averages. By August, patient volumes began to approach pre-pandemic levels. The re-opening of school on September 1 coincided with a return to pre-pandemic levels. The second lockdown again decreased volumes by 50% before returning to pre-pandemic levels until the third national lockdown over January of 2021. In comparison, during the Gaza conflict (July 8, 2014–August 26, 2014), when our hospital was within a 60 s radius of rocket fire, patient volume decreased 9.8% from the prior 3 year average.

Pediatric hospital admission rate during the pandemic period was decreased slightly to 18% compared with previous 3 year average of 19.6%. Length of stay (LOS) in the PED decreased from the previous 3 year average of 2.9 h to 2.6 h. During the pandemic the decrease in PED patient volume was most pronounced in younger children, particularly 0–2 years of age (Fig. 1).

Respiratory illness was 70% below the previous average in April and May and remained below the prior 3 year average though the pandemic year. Gastrointestinal illness decreased by 62% from March through July before nearing prior years' average in August and exceeding the previous 3 year average in September (Fig. 2). Only 59 PED patients have had positive polymerase chain reaction tests for SARS-CoV-2 through January 31, 2021. Forty three of those cases were recorded after September 1.

Injury requiring physician intervention (laceration, dislocation, fracture, open wound) neared the pre-pandemic average from June, and exceeded prior years averages from November through January. Visits for burns were higher than the 3 year average in six of last 8 months. Head injury was higher than average in only three of the first 9 months, and 56% higher over the last 3 months. There was a decrease in the number of visits for minor injury with the exception of December (Fig. 3) and an increase in all injury as a percentage of visits throughout the pandemic.

Severity of injury seen in the PED increased as well: fractures treated surgically were decreased from average through most of the year before becoming above average toward the end of the pandemic year (Fig. 4).

The three national lockdowns were characterized by a consistent decrease in infectious disease diagnoses. However, as the lockdowns progressed, we saw an increase in the numbers of injuries when compared to the previous 3 year average for those periods (Fig. 5). Adherence to lockdown may be reflected in the decrease in motor vehicle crash related visits which spanned from 71% over March and April compared to the 3 year average to only 11% over November through January.

Severity of patients' conditions increased as the lockdowns progressed. During the first lockdown, the percent of infectious disease and the percent of fracture/dislocation admitted to the hospital was less than the previous average for that period, roughly equal to the previous average during the second lockdown, and greater than the previous average during the third lockdown (Fig. 6).

Recent reports show a sustained decrease in pediatric emergency department (PED) volumes worldwide over the COVID-19 pandemic [1–5], characterized primarily by a decrease in presentations for infectious disease [6,7], and absence of seasonality [8]. Lack of out-of-home child care is associated with lower incidence of infectious disease [9], but data from the SARS pandemic showed that school closure did not contribute to control of the epidemic [10]. Data from England shows that infections did increase after returning to school in the Fall, but not at a rate higher than the adult population [11].

Contradictory reports exist for the relationship between out-of-home child care and incidence of injury [12,13]. Reports early in the pandemic note a decrease of up to 43% in pediatric fractures, mostly due to the absence of organized sports and decreased playground use [14]. A recent report from a large sample of US PEDs shows a similar drop in fractures by 40% from January to June 2020 [15]. Others have reported a decrease of 34% in all injury diagnoses and a 73–77% decrease in minor injury diagnoses early in the pandemic [2,3,16]. The majority of Israelis live in apartments with an average size of around 150 square meters, which may not be as suitable for extended play as school.

In conclusion, repeated national lockdowns were associated with a sustained decrease in PED presentations for infectious disease compatible with periods of social distancing, and an increase in injuries which may reflect “lockdown fatigue” combined with the lack of organized activity (school and summer camp) during this period.

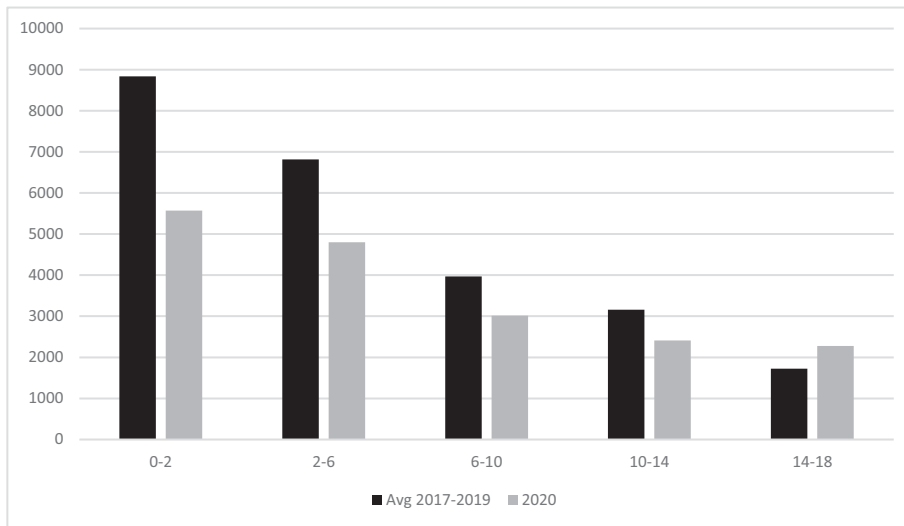


Fig. 1. Visits to the PED by age in years.

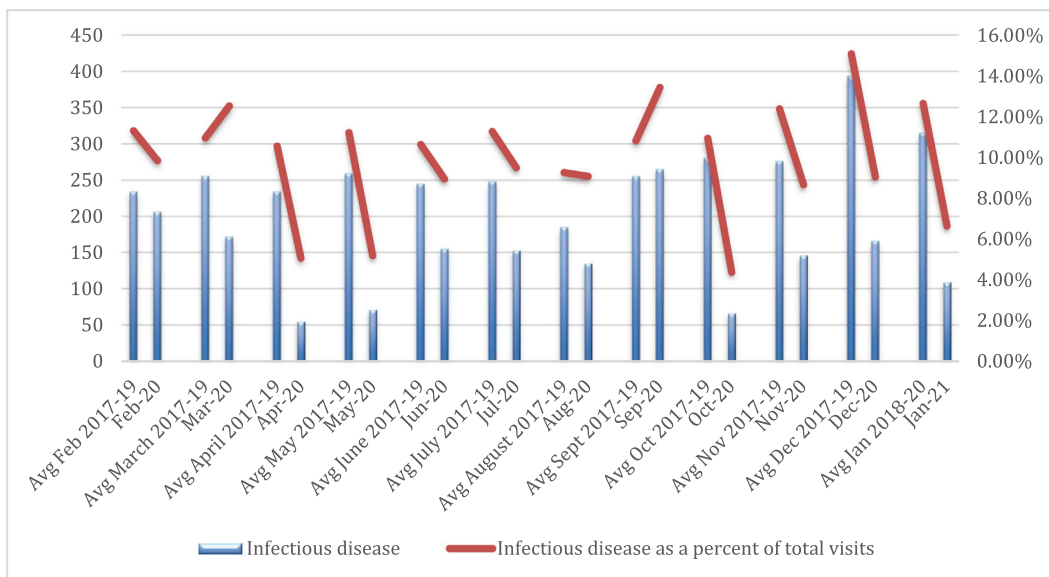


Fig. 2. Respiratory and gastrointestinal infectious disease over the pandemic year on a monthly basis compared with the average for those months over the three preceding years, in numbers and as a percent of total PED visits for that period.

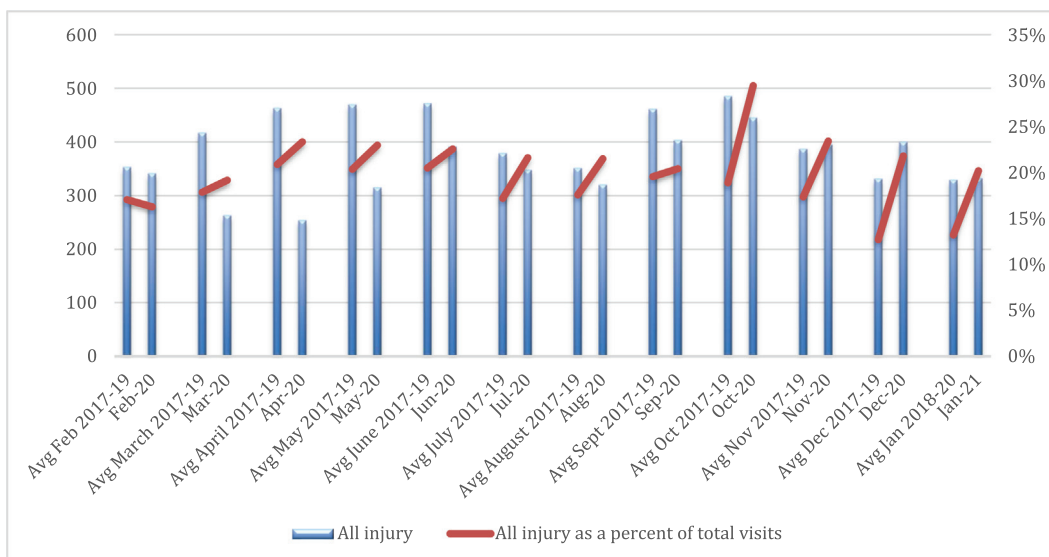


Fig. 3. Injury diagnoses over the pandemic year on a monthly basis compared with the average for those months over the three preceding years, in numbers and as a percent of total PED visits for that period.

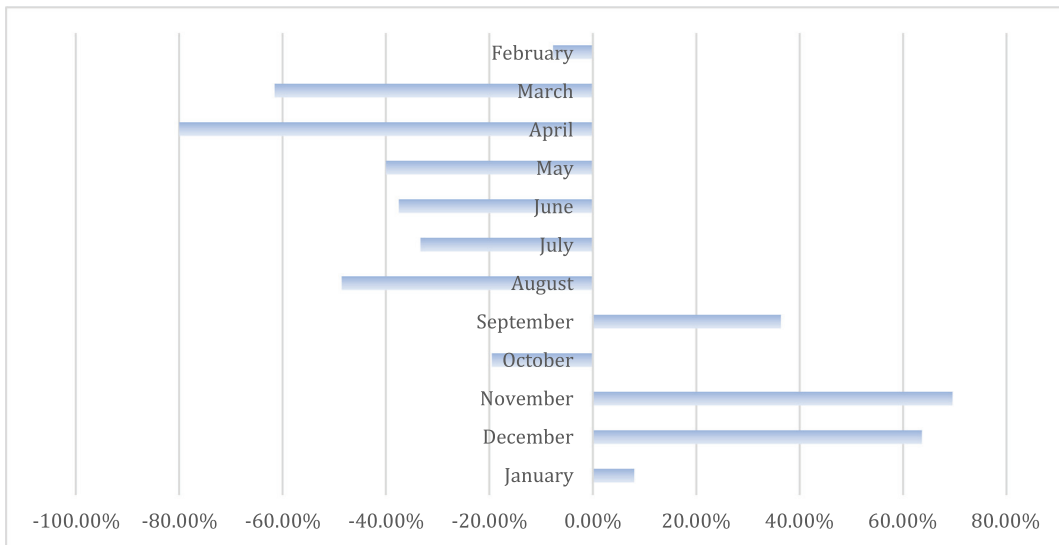


Fig. 4. Percent change in fractures seen in the PED and treated surgically, compared with the average for the prior 3 years.

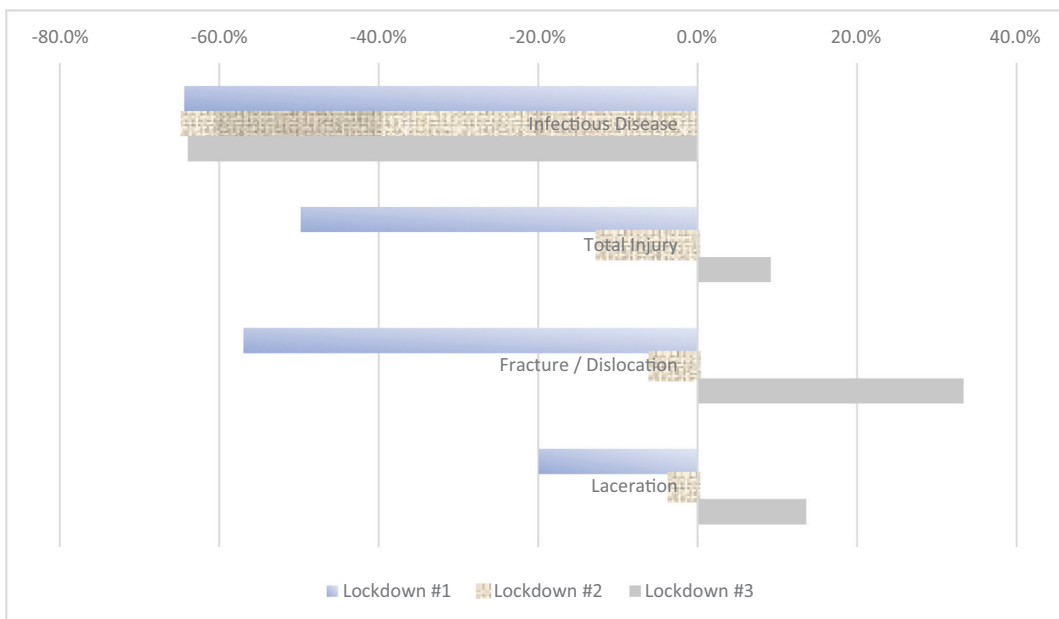


Fig. 5. Percent change in PED visits compared with the average for the three preceding years over the periods of the three national lockdowns.

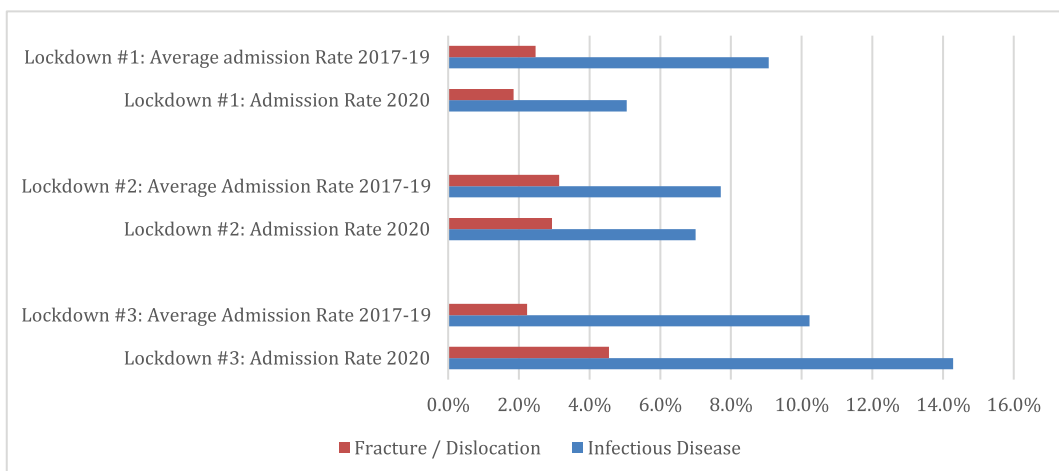


Fig. 6. Admission rates over the periods of the three national lockdowns compared with the average for those periods over the three preceding years.

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Consent for publication

N/A.

Author contributions

Dr. Scheier designed the study, analyzed the data, and wrote the manuscript.

Dr. Levick reviewed the data and wrote sections of the discussion.

Dr. Guri reviewed the data and wrote sections of the discussion.

Dr. Balla reviewed the data and drafts and made material changes to text and figures.

Declaration of competing interest

The other authors have no conflicts of interest to disclose.

Appendix 1

ICD-9 Diagnosis codes collected:

Fracture/dislocation: 813, 81381, 81308, 81305, 80709, 807, 81401, 81321, 8132, 800, 803, 80000, 8073, 82380, 823, 8260, 81322, 81391, 818, 80500, 820, 81512, 81610, 81342, 808, 826, 2217, 803, 81241, 81345, 8248, 805, 83201, 802, 82100, 82301, 81305, 812, 81242, 8124, 8134, 81344, 827, 8022, 815, 82525, 8020, 80220, 816, 81600, 81381, 81308, 81305, 80709, 807, 81401, 81321, 8132, 8073, 82380, 8080, 81501, 81400, 8100, 81602, 81600, 8150, 8260, 8160, 8026, 82320, 81300, 82300, 81400, 81341, 802, 8024, 8290, 81342, 827, 824, 8090, 810, 81343, 81301, 8320, 83400, 8398, 832, 7543, 830, 836, 8398, 8363, 8398, 831

Laceration: 8921, 88100, 87342, 87362, 882, 8820, 8736, 891, 87343, 8732, 87365, 8730, 8782, 890, 8931, 87364, 87363, 8796, 8786, 8910, 9176, 882, 87340, 894, 884, 87361, 877, 872, 8728, 881, 87200, 87340, 8734, 883, 8830, 8921, 88100, 87342, 891, 87343

Respiratory: 7860, 78609, 485, 4870, 482, 481, 486, 4829, 486, 4809, 480, 493, 49392, 49391, 4939, 78607, 4659, 4789, 7862, 46611, 4661

Gastroenteritis: 7870, 78701, 78703, 5781, 78791, 93, 5643, 5589, 90, 91, 88, 30

Other injury: 92820, 92810, E9259, E9882, 9591, 8713, 95909, 910, 5212, 9591, 9594, 71886, 9597, 9598, 959, 867, 95914, 915, 7279, 9198, 86800, 7782, 929, 9273, 95909, 910, 5212, 9594, 9100, 920, 95901, 9110, 9130, 9160, 9100, 9160, 9130, 9131, 9190, 9191, 918.1, 9181, 9221, 92311, 9231, 9219, 9213, 9211, 920, 9233, 92420, 92310, 9224, 92320, 920, 95901, 92401, 92411, 9241, 9245, 9248, 9212, 922, 9243, 9239, 923, 92321, 851, 924, 9249, 923, 9221, 9249, 924, 9229, 9222, 92421, 9242, 9223, 92311, 9231, 9219, 9213, 9211, 9233, 92420, 92310, 9224, 92320, 924, 9212, 922, E8889, E8844, E8842, E8840, E8811, E888, 8450, 8430, 843, 840, 8469, 8489

Head injury: 800, 80000, 803, 850, 9100, 851, 9590, 8739, 87342, 873, 7680, 8522, 8530, 853, 85401

Motor vehicle accident: E9885, E819, E8192, E8196, E8199, E816, E8160, E8168, E8163, E8167, E813, E8137, E8139, E814, E8142, E8144, E815

Bites: E9065, E9069, E9059, E9065, E9060, E9283, 9194, 9195, 9104, E9052, 9895

Burns: 94802, 94203, 94204, 9490, 94110, 94129, 9480, 94202, 94100, 9471, 945, 94108, 94502, 94300, 943, 9403

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