



IMPACT OF COVID-19 PANDEMIC RESPONSE ON THE UPTAKE OF ROUTINE CHILDHOOD IMMUNISATION AT A TERTIARY CARE CENTRE IN MUMBAI.

Community Medicine

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ABSTRACT

Background The COVID-19 pandemic response has impacted the delivery of healthcare, including routine childhood immunisation. This manuscript studies the extent of this impact. **Objectives** To assess the decline in daily average routine childhood immunisation uptake compared to the baseline level and to assess the problems faced by the beneficiaries in accessing the immunisation services during the pandemic period at a tertiary care centre in Mumbai. **Methods** Data of daily routine childhood immunisations in the year 2019 and 2020 was collected from the immunisation records register of Child Welfare Centre (CWC) of the tertiary care centre. The baseline (2019) and the COVID-19 lockdown period data were compared to analyse the impact on daily routine childhood immunisation uptake. Guardians of beneficiaries visiting the CWC from 24 December 2020 to 23 January 2021 were interviewed using a questionnaire to study the causes of delayed/missed immunisations. **Results** There was 24.62% decline ($p < 0.05$) in the number of immunisations administered in 2020 compared to 2019. Fear of COVID-19 infection (45.9%), migration to hometown due to lockdown (13.11%), travelling restrictions during lockdown (9.84%) and miscellaneous reasons (31.15%) were the reasons given by the 93 guardians interviewed for delayed/missed immunisations (63.16%). **Conclusion** COVID-19 pandemic response has led to a disruption in immunisation services, leading to a drop in uptake. Childhood immunisation and implementation of strategies to achieve significant immunisation coverage should be prioritised during pandemics.

KEYWORDS

COVID-19 ; coronavirus ; pandemic ; routine childhood immunisation ; VPDs

Introduction

The first case of covid-19 was detected in India on January 27, 2020 in Kerala (1). Following the rapid spread of the virus the current statistics stand at 34,355,987 confirmed cases and 461,057 confirmed deaths as of 09/11/2021 (2).

The country went into a nationwide lockdown on 24th March 2020, which was extended till 30th May 2020. Following this, the unlock phase began from 1st June 2020 with restrictions being relaxed in a phased manner based on the covid-19 situation of each state. The covid-19 pandemic response has impacted the delivery of all essential services, including routine childhood immunisation.

An immunisation pulse poll in the context of covid-19 conducted by the WHO between 14th and 24th April 2020 showed that there is widespread disruption to routine immunisation programs affecting all WHO regions (3). The disruption could possibly be due to logistical difficulties faced by the beneficiaries due to the lockdown and social distancing, fear of contracting covid-19 or problems on the provider side like- shortage of PPE, vaccine supply shortages and staff shortage (4). This makes the children vulnerable to diseases like measles, diphtheria, wild poliovirus (type 2) and can lead to outbreaks of VPDs (5) (Vaccine Preventable Diseases) which can have adverse short- and long-term implications; as witnessed in the Ebola outbreaks in the African countries where the deaths from measles in those countries, due to disruptions in immunisation services, were almost three times that of the deaths from Ebola (6).

Among the 73 Gavi eligible countries, India has been worst hit by the pandemic and also has amongst the highest number of zero dose children (7). India's vaccination coverage stands at 65% (8). Health emergencies are known to alter health seeking behaviour and put a strain on the health system, precipitating secondary disease outbreaks (9) (10) (11).

To avert this adverse outcome, there is a need to formulate guidelines, policies and catch-up campaigns to address the deficit in vaccinations due to the pandemic. This requires an estimation of the impact of covid-19 pandemic response on routine childhood immunisation uptake and to assess the barriers faced in accessing immunisation from the beneficiary side. Country specific data under this is poorly available. Hence, the objective of this study was to assess the decline in daily average routine childhood immunisation during the covid-19 pandemic period in 2020 compared to the baseline level of 2019 and to assess the problems faced by the beneficiaries in accessing routine

childhood immunisation during the pandemic. This manuscript presents the impact of covid-19 on routine childhood immunisation services in a tertiary care centre in Mumbai.

Materials and Methods

Study setting: Child Welfare Centre at a tertiary care centre in Mumbai.

Study design and population: The data on daily routine childhood immunisations in the year 2019 and 2020 was collected from the immunisation records register of the CWC (Child Welfare Centre) of tertiary care centre in Mumbai. As this data did not contain the demographic details of the beneficiaries and since we wanted to find out the possible causes of disruption to immunisation services from the beneficiary side, we interviewed the beneficiaries visiting the CWC from 24th December 2020 to 23rd January 2021, using a questionnaire. For this, an institution based descriptive cross-sectional study with purposive sampling was carried out. All the children coming to the OPD for Routine Childhood Immunisation whose parent/guardian gave an informed consent were included in the study. Children whose parent/guardian denied the informed consent were excluded.

Daily childhood immunisation data of the year 2019 and 2020 was collected. Data collected includes the number of doses of each antigen administered daily, according to the vaccination schedule. The 2019 data was considered as the baseline level and compared to the 2020 covid-19 pandemic period.

The data of beneficiaries was collected by interviewing the beneficiaries visiting the CWC during the period 24th December 2020 to 23rd January 2021. The data collected through the interview includes- age, education and occupation of the guardian of the child, their views regarding child immunisation, whether the doses of the child were delayed due to the pandemic and reasons for this delay.

Sample size and sampling: Purposive sampling was done and all 93 beneficiaries, visiting the CWC between 24th December 2020 to 23rd January 2021 were interviewed.

Study tools and study variables: A pre-validated questionnaire was used for the interview.

Data entry and analysis: The baseline daily average immunisations were calculated and compared to the daily average immunisations during the covid-19 pandemic period using the Unpaired t test and a

graph was plotted. The percentage decline in total doses administered in 2020 was calculated.

Vaccination schedule: The National Immunization schedule includes 9 visits. The antigens administered are- BCG, OPV, Hepatitis B, Pentavalent vaccine, Rotavirus vaccine, fractional IPV, Measles and Rubella, DPT and Tetanus (12).

COVID-19 lockdown: Nationwide lockdown was imposed from 24th March 2020 and extended till 30th May 2020, followed by a staggered unlock in multiple phases. The lockdown imposed a complete ban on movement, except for essential services including healthcare services. The outreach immunisation services in the containment zones were completely suspended and only immunisations in health care centres for walk in beneficiaries were permitted. For buffer zones and green zones, modified outreach services were allowed with specific guidelines to be followed while conducting the outreach session (13). Here, the data collected indicates only the walk-in beneficiary immunisations.

Results

We calculated the baseline daily average immunisations and compared it to the daily average immunization during the covid-19 pandemic period. The percentage decline in total doses administered in 2020 was calculated. The total doses administered in 2019 were 6,689. Total doses administered in 2020 were 5,042. Hence, the decline in the number of doses administered in 2020 compared to the baseline level is 24.62% (TABLE 1 AND FIGURE 1). Unpaired t test was applied, which showed a significant decline in the total doses administered in 2020 compared to 2019 and the months April and May showed a significant decline compared to the corresponding periods in 2019 (two tailed p value < 0.05). The highest decline was seen in the doses administered of DPT- 55.22% followed by MMR- 36.86%. The percentage decline of other antigens- OPV (Oral polio virus)- 35.8%, Measles- 10.46%, Pentavalent- 33.98%, IPV- 33.98%. There was an increase in the doses of Rotavirus antigen by 81.99%.

To analyse the causes of decreased immunisation uptake, from the data collected by interviewing the beneficiaries, we calculated the percentage of beneficiaries who had delayed doses or missed doses and analysed the causes of this delay. 93 beneficiaries visiting the CWC were interviewed. Out of this, 58.95% had delayed doses, 36.84% had doses on time and 4.21% had missed doses. Amongst the beneficiaries with delayed doses, 41.07% had a delay of 1-15 days, 7.14% had a delay of 16-29 days and 51.79% had a delay of more than or equal to 30 days.

The beneficiaries with delayed and missed doses were asked about the problems they faced in accessing immunisation services. (TABLE 2) 45.9% answered fear of covid 19 infection, 13.11% answered migration to their home town due to the lockdown prevented them from visiting the CWC at the scheduled date, 9.84% answered travelling restrictions due to the lockdown and 31.15% had miscellaneous reasons.

Comparison of the age, occupation and education of the guardian of the beneficiaries with the delay, if any, and awareness of the importance of timely child immunisation was done. When asked if they think routine childhood immunisation at the scheduled time is important, 91.4% answered yes, 5.38% answered "I don't know" and 3.23% answered no.

The guardians of the beneficiaries who had received their doses on time were asked what motivated them to immunise their child during the pandemic, 51.43% answered that they felt routine child immunization is important and no dose should be missed, 25.71% answered that they stayed near the immunisation centre so they didn't face any difficulties in travelling during the pandemic, 22.86% had other reasons.

Beneficiaries were asked if they were aware of the consequences of missing or delaying routine child immunisation, 61.29% answered NO and 38.71% answered YES.

Discussion

This study provides a comprehensive, evidence-based analysis of the impact of COVID-19 pandemic response on routine childhood immunisation at a tertiary care centre in Mumbai. The overall decline

in daily average immunisation doses in the institute is by 24.62% in 2020 compared to 2019. On extrapolating these values to the nationwide scenario, there would be a drastic decline in the daily immunisation doses. The highest decline was seen of DPT and MMR, which is problematic as respiratory and gastrointestinal infections form a major cause of under-5 mortality in India (14). Rotavirus had an increase in doses, as this antigen was only made available in the CWC from the July of 2019, leading to greater number of doses being administered in 2020. A significant decline was noted in the months April to May. The rise in immunization since June could be due to the Unlock phases which started on 1st June. To address and overcome this deficit, there is a need to analyse the cause of this deficit.

For this, the 93 beneficiaries who were interviewed were divided into 2 categories- 1) doses on time 2) delayed/missed doses. On the demand side, there are several factors contributing to the observed decrease in the recorded immunisations. Parental reluctance to get children vaccinated out of the fear of exposing their children to infection during vaccination session (45.9%) remains the major reasons for delayed or missed doses. Migration of the beneficiaries to their native places where immunisation services were not easily accessible (13.11%) had a major role in the drop in coverage. Moreover, factors including restrictions on movement enforced by the authorities and unavailability of public transport (9.84%) played a considerable role in the drop in coverage. Other reasons include poor health of the child or parent or unawareness of the parents about the scheduled dose (31.15%). We analysed the education and occupation of the guardian in both the groups, in the first category, more than 50% of the guardians were from the higher education categories (Graduates, professional degree, diploma, high school) whereas from the second category, more than 50% guardians were from the lower education categories (Illiterate, primary school, middle school). Occupation of the guardian of beneficiary was asked, 66.07% in the second category were unemployed while 34.29% in the first category were unemployed. Although 91.40% of the guardians answered that they felt childhood immunisation at the scheduled time is important, only 31.71% were aware of the consequences of delayed or missed doses.

With fewer children coming to the institute, we expected a sharper decrease in the vaccines with larger multi-dose vials like measles, with the assumption that the health workers may refrain from opening them when only few children are showing up for vaccination. However, our findings did not show such decline, we see a higher level of follow-ups on Thursday, the day of the week that measles vaccination is most commonly provided. Conducting outreach sessions through mobile vans and defaulter list generation through electronic immunisation records are some of the solutions that can be implemented.

We also observed that, as the unlock phase began in the country from 1st June 2020, the immunisation coverage started to increase steadily in the institute. But still, the daily average number of doses has not reached the expected or baseline levels even by the end of 2020 as the pandemic still prevails. With the second wave being more devastating than the first wave and also causing a severe form of disease in the younger age group compared to the first wave (15), this has generated even more fear amongst people from visiting healthcare facilities. As the country is now anticipating a third wave, it is certain that the pandemic will not be resolving anytime soon. There is, hence, an urgent need to look into the matter of childhood immunisation and formulate strategies to ensure that we do not have to deal with outbreaks of VPDs superimposed with the already deadly pandemic the country is dealing with.

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Table 1: COMPARISON BETWEEN DAILY AVERAGE IMMUNISATION IN 2019 WITH DAILY IMMUNISATION DURING COVID-19 PERIOD IN

Months	Daily average immunisations in 2019	Daily average immunisations in 2020	Change (in %)	p value
January	16.97	20.52	20.92	0.121
February	16.43	19.1	16.25	0.21476
March	17.13	12.9	-24.69	0.11507
April	15.27	5.67	-62.87	0.000054

May	17.19	8.13	-52.71	0.000078
June	16.7	10.8	-35.33	0.027429
July	18	12.97	-27.94	0.019226
August	17.48	11	-37.07	0.031443
September	19.5	14.3	-26.67	0.064255
October	19.94	14.52	-27.18	0.045514
November	22.53	17.77	-21.13	0.093418
December	22.61	17.77	-21.41	0.068112

Table 2: VARIOUS PROBLEMS FACED BY BENEFICIARIES IN ACCESSING ROUTINE CHILD IMMUNIZATION DURING PANDEMIC PROGRAMME.

Reasons for delayed/missed doses	Number of beneficiaries	Percentage (%)
Fear of COVID-19 infection	28	45.9
Other reasons	19	31.15
Migration	8	13.11
Traveling restrictions	6	9.84
Total	61	100

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