Impact of the COVID-19 pandemic on emergency department attendances and admissions in Southampton for children and young adults

Investigators

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Additionally, Fola Solanke (a final year medical student at University of Southampton) who is currently attached to Professor Roberts's group will be assisting with the analysis of the project data.

Project aim
To assess the ongoing impact of the COVID-19 pandemic on attendances by children and young adults to the emergency department and admissions to the hospital.

Objectives:
1. Assess the impact of the pandemic on overall (a) emergency department attendances and (b) hospital admissions for 0 to 4, 5 to 10, 11 to 17 and 18 to 24 year groups.

2. Assess the impact of the pandemic on (a) emergency department attendances and (b) hospital admissions for specific medical, surgical, trauma and mental health conditions for 0 to 4, 5 to 10, 11 to 17 and 18 to 24 year groups.

Background

The COVID-19 pandemic has had a major impact on healthcare utilisation and delivery for children and young adults. This is despite them experiencing minimal morbidity and almost no mortality as a direct result of the pandemic (Docherty 2020). The immediate impact of the first lockdown in April 2020 has been well documented. A number of studies show a marked reduction in presentations of children and young adults to the emergency department (Dann 2020; Isba 2020; Roland 2020).

The question is now, are these trends continuing and are they particularly impacting on specific groups and on specific presentations? With these data, services can be modified to minimise any potential for deleterious effects. It may also be possible to target groups who are not utilising health services as we would expect.

Study design
This project will analysis an anonymised database from retrospective electronic medical records of participants who presented or been admitted to University Hospital Southampton NHS Foundation Trust.

Participants
Children and young adults aged 0 to 24 years who have presented +/- admitted to the emergency department at University Hospital Southampton NHS Foundation Trust between the 1st of April 2016 and 31st of March 2021.

Data to be used in analysis
This project we use an anonymized data set meaning that it will contain no identifiable data (including but not limited to name, date of birth, hospital number, NHS number, address). The anonymized dataset will be provided by Dr David James who is a consultant paediatrician at University Hospital Southampton NHS foundation trust and is a collaborator on the study. Prior to anonymisation, postcode data will be used to generate a deprivation score for participant via their Office of National Statistics (ONS) small area code (Office National Statistics).

Data used in the project will include calender week of presentation/admission, age in complete years (rounded down), gender, ethnicity, refer (eg self, ambulance, GP, 111), presenting/discharge diagnosis, deprivation decile and re-attendance.

Outcomes
Attendance at the emergency department in Southampton defined as being booked onto the emergency department admission system. Participants will be divided into the following age groups: 0 to 4, 5 to 10, 11 to 17 and 18 to 24 years.

As well as all attendance, we will also look specifically at a number of subgroups. These will depend on the diagnostics labels attached to the data. It is expected that they will be:
- Respiratory infection, e.g. bronchiolitis, chest infections, pneumonia,
- Asthma and wheeze
- Gastrointestinal, E.g. gastroenteritis, vomiting
- Surgical, E.g. appendicitis, intestinal obstruction
- Mental health, e.g. overdose, self-harm
- Accidental injuries/trauma
- Non-accidental injury or safeguarding
- Diabetes

Admission to University Hospital Southampton NHS Foundation Trust defined as being in hospital for more than four hours. Participants will be divided into the same subgroups as per attendances.

Potential explanatory variables
These are factors that might explain differences between different participants in the study. They are:
- calendar week of presentation/admission - it is expected that the data will be seasonal.

- age in complete years - it is expected that patterns will differ for the different age bands.
- gender - it is possible that patterns will vary by gender.
- ethnicity - it is possible that patterns will vary by ethnicity.
- deprivation decile - it is possible that patterns may vary by participants social economic status. This will be indicated by their ONS deprivation decil.

Approach to analysis

Graphical presentation of data

The data for presentation and admission will be separately presented by graphical and/or tabular means. For each age band overall number of presentations/admissions will be presented for each calendar week from April 2016 to March 2021. This will be repeated for each of the presenting and discharge diagnoses listed above. Further graphs will be presented looking at male and female participants, white and non-white participants and deprivation decils 1-3, 4-7 and 8-10 separately. Figures will be annotated with key events e.g. first COVID-19 case in the UK, first death in the UK, lockdown periods and imposition of different levels plus dates of key local pathway changes (eg opening of new children emergency department (December 2018) and movement of paediatric assessment unit to the emergency department (September 2019).

Interrupted time series regression analysis

To assess the impact of the pandemic on presentations in admissions, an interrupted time series regression analysis will be undertaken using Stata (version 16). The primary analysis will focus on the total attendances and admissions. The various subgroups will represent exploratory analyses. A single group comparison will be used looking at the trend in presentations and admissions before and after the March 2020 lockdown. Given the expected number of presentations and admissions, data will be groups into four week time periods (13 in each calendar year).

Using this time series regression analysis approach we will control for seasonality and also assess whether gender, ethnicity or deprivation influence any change in presentation or admissions. A p-value of less than 0.05 will be taken to indicate statistical significance.

Sample size analysis

There are no established approaches to undertaking a power analysis for an interrupted time series. A scoping review (Ewusie 2020) suggests that "24 or more time points have more than 80% power to detect an effect size of 1 or greater" and "that a minimum of 8 time points per period is required to gain sufficient power in estimating the regression coefficients". With five years of data and 13 4-weekly blocks per year, we have 65 time points, 12 of which will be after the first lockdown. In total, we expect to have around 2000 attendance and 400 admissions in each four week block for the primary analysis. This is expected to provide at least 80% power for the primary analysis. For specific conditions, number are likely to be smaller; for example, there may be around 50 attendances for mental health conditions in each four-week block.

Ethical and research governance considerations

This project uses routine clinical data which will be anonymized prior to its use by the research team. It therefore just falls outside the General Data Protection Regulations. Under the current research governance framework, it is also exempt from research ethics committee assessment (Health Research Authority). However, as it involves the utilisation of data from

NHS patients, it needs to be assessed by the Health Research Authority. It also requires an assessment by the faculty of medicine research ethics committee at the University of Southampton.

Planned dissemination

The results will be presented locally in Southampton and the Wessex region to inform the local stakeholders. Additionally, one of more publications will be submitted, eg abstract to a national meeting and/or a manuscript to a peer review journal. Authorship for these will follow the International Committee of Medical Journal Editors recommendations, in brief substantial contributions to the conception or design of the work, or the acquisition, analysis, or interpretation of data for the work; drafting the work or revising it critically for important intellectual content; final approval of the version to be published; and agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work (ref International Committee of Medical Journal Editors).

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