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Real-time modelling of a pandemic influenza outbreak

Submission date
08/11/2013

Recruitment status
No longer recruiting

Registration date
15/10/2014

Overall study status
Completed

Last Edited
09/11/2017

Condition category
Infections and Infestations

[_] Prospectively registered
[_] Protocol
[_] Statistical analysis plan
[X] Results
[_] Individual participant data

Plain English summary of protocol

Background and study aims
The response of governments during a pandemic are aimed at two main functions: mitigation (to restrict the spread of the virus) and treatment (proper care for those affected). To implement these, a government needs to be able to estimate the effects of any policies introduced. This requires knowledge of how healthcare services are going to manage the situation due to the pandemic, particularly as the pandemic evolves. This is known from data on the levels of infection amongst the population. Ideally, data would be available on the number of new infections, but this is rare if infection is widespread and with no symptoms. Instead data mainly come through screening, recording the number of new hospitalisations or consultations amongst patients with influenza-like illness, perhaps in hospitals or general practices. These datasets contain only a limited amount of information and are susceptible to biases. Therefore, it is preferable to use as many relevant data sources as possible to build an overall picture of the current pandemic situation and predict its future development. A tool is required in the midst of a pandemic to transform these data into meaningful predictions of the burden upon the health service. Real-time modelling involves the use of continuously incoming information to update and revise the estimate of the epidemic features, the future of the pandemic and the assessment of the effectiveness of policies. The difficulty in real-time modelling are: direct data on the transmission process are typically unavailable, and the surveillance data only informs it indirectly. The aim of this study is to improve the real-time modelling approach we developed earlier, whilst remaining on-call to support Public Health England (PHE), who are going to implement this should a pandemic outbreak actually occur.

Who can participate?
No patients or healthy volunteers are involved.

What does the study involve?
Various advancements to the real-time modelling are made to include greater variations between regions, additional data, enhance the efficiency of the algorithm and evaluate the interventions that are likely to be implemented during the pandemic.

What are the possible benefits and risks of participating?
Developing the current approach will result in more accurate estimates and predictions. More

importantly, the timeliness of the availability of treatment will also be improved, so that the model is truly operating in real time.

Where is the study run from?
The research is office-based and involves model development and testing of real-time modelling systems. This will take place at the Medical Research Council Biostatistics Unit (MRC-BSU) (UK)

When is the study starting and how long is it expected to run for?
October 2012 to September 2015

Who is funding the study?
National Institute of Health Research (NIHR) (UK)

Who is the main contact?
Dr Daniela De Angelis
daniela.deangelis@mrc-bsu.cam.ac.uk

Contact information

Type(s)
Scientific

Contact name
Dr Daniela De Angelis

Contact details
MRC Biostatistics Unit
Cambridge Institute of Public Health
Forvie Site
Robinson Way
Cambridge Biomedical Campus
Cambridge
United Kingdom
CB2 0SR

Additional identifiers

EudraCT/CTIS number

IRAS number

ClinicalTrials.gov number

Secondary identifying numbers
HTA 11/46/03

Study information

Scientific Title

Real-time modelling of a pandemic influenza outbreak with two phases: a pre-pandemic phase and an in-pandemic support phase

Study objectives
The purpose of this project is to advance the real-time modelling approach we developed in response to the 2009 pandemic, whilst remaining 'on call' to support Public Health England (PHE), who are tasked with its implementation should a pandemic outbreak actually occur. This advancement is anticipated to be in the form of:
1. Improving the efficiency with which real-time statistical inferences can be made.
2. Building capacity in terms of the different types and increasing the volume of data that can be used in real-time.
3. Accounting for spatial heterogeneity through the modelling of separate but linked epidemics in spatially disjoint regions (e.g., as currently defined by Strategic Health Authority).
4. Accounting for any likely pandemic mitigation or treatment interventions.
5. To provide a suite of software to implement the above.
6. To support Public Health England (PHE) in providing, in the event of a pandemic, estimates and projections of:
6.1. Age- and region-specific incidence of infection.
6.2. Current and predicted total number of cases.
6.3. Key epidemic parameters, such as the basic reproduction number, R0, and the proportion of infections leading to symptomatic illness.
7. Incorporation of additional data streams on severe events, anticipated as part of the research, will allow also outputs on predicted severe events.
The majority of the research takes place prior to any pandemic outbreak.

Ethics approval required
Old ethics approval format

Ethics approval(s)
No data is generated as a direct result of this project. No participants are recruited to the study.

Study design
Two phases:
1. A pre-pandemic phase of model development
2. In-pandemic support to PHE's real-time modelling based on data from routine and pandemic surveillance schemes

Primary study design
Observational

Secondary study design
Other

Study setting(s)
Other

Study type(s)
Screening

Participant information sheet

N/A

Health condition(s) or problem(s) studied
Pandemic influenza

Interventions
The aim is the enhancement of real-time modelling of infleuenza epidemics. These advancements include:
1. Modifications to the existing model to incorporate greater variation between regions. The current system only allows for the consideration of a single region at a time.
2. Modifications to the existing model to incorporate new or additional data streams, envisaged for future pandemics.
3. Enhancement of algorithmic efficiency. This involves considering state-of-the-art model fitting algorithms, ensuring modelling results are obtained quickly and efficiently.
4. Evaluation of interventions likely to be implemented. Already we can estimate the effect of school closures, but other interventions such as vaccination will be considered.

Intervention Type
Other

Phase
Not Applicable

Primary outcome measure
To be in a position to provide, in the event of a pandemic influenza outbreak, support to PHE in their task of producing estimates and projections of the epidemic state, and thus contributing valuable input to the public health response.

Secondary outcome measures
The success of the real-time system will additionally be measured through the teams ability to provide:
1. Software to implement a timely and reliable monitoring of an emergent influenza epidemic
2. Scientific publications and dissemination of results, with appropriate acknowledgement of data sources and consultation with data providers
3. Provide valuable input to public health response

Overall study start date
01/10/2012

Completion date
30/09/2015

Eligibility

Key inclusion criteria
N/A

Participant type(s)
Patient

Age group
Not Specified

Sex
Not Specified

Target number of participants
0

Key exclusion criteria
N/A

Date of first enrolment
01/10/2012

Date of final enrolment
30/09/2015

Locations

Countries of recruitment
England

United Kingdom

Study participating centre
MRC Biostatistics Unit
Cambridge
United Kingdom
CB2 0SR

Sponsor information

Organisation
National Institute for Health Research (UK)

Sponsor details
Evaluation, Trials and Studies Coordinating Centre
University of Southampton
Alpha House, Enterprise Road
Southampton
United Kingdom
SO16 7NS

Sponsor type

Government

Website
http://www.netscc.ac.uk

ROR
https://ror.org/0187kwz08

Funder(s)

Funder type
Government

Funder Name
Health Technology Assessment Programme

Alternative Name(s)
NIHR Health Technology Assessment Programme, HTA

Funding Body Type
Government organisation

Funding Body Subtype
National government

Location
United Kingdom

Results and Publications

Publication and dissemination plan
Not provided at time of registration

Intention to publish date

Individual participant data (IPD) sharing plan

IPD sharing plan summary
Not provided at time of registration

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Results article	results	01/10/2017		Yes	No