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Antibiotic Review Kit for Hospitals (ARK-Hospital)

Submission date	Recruitment status	[_] Prospectively registered
10/04/2017	No longer recruiting	[X] Protocol
Registration date	**Overall study status**	[X] Statistical analysis plan
20/04/2017	Completed	[X] Results
Last Edited	**Condition category**	[_] Individual participant data
06/05/2025	Infections and Infestations	

Plain English summary of protocol

Background and study aims
Antibiotics kill bacteria, but don't cure viral infections. When sick patients arrive at hospital, doctors have to work out whether they have a bacterial infection, viral infection, or another illness. This is difficult, because initial symptoms can be very similar (i.e. cough, temperature). Finding out exactly why a patient is sick takes a while, so it makes sense to give antibiotics initially. However, Department of Health guidance recommends stopping antibiotics when it becomes clear that they aren't needed anymore. This could be because doctors work out that the patient never had a bacterial infection, or because they have got better. Stopping antibiotics when they aren't needed reduces the chances of disease-causing and other gut bacteria becoming resistant to antibiotics. It is also important because antibiotics kill 'friendly' gut bacteria. But stopping antibiotics when they are no longer needed often doesn't happen. Sometimes this is 'just in case' or thinking 'better safe than sorry', or because of the myth that antibiotic courses must be completed to avoid resistance. A package of strategies that can help healthcare professionals and patients stop taking antibiotics has been developed using internet-based training, standardised systems to review patients, regular support from pharmacists /infection specialists and material for patients. The aim of this study is to test a package of strategies developed specifically to help doctors, nurses, pharmacists and patients stop antibiotics in hospitals when they are no longer needed.

Who can participate?
NHS Trusts who admit patients to acute/general medicine and adults aged 18 and older who have received antibiotics in the hospital.

What does the study involve?
Participating trusts are randomly allocated to when they start the programme. They receive a package of strategies to help stop antibiotics in hospital when they are no longer needed. The package includes internet-based education, training, standard systems to help doctors review patients, regular support from pharmacists or infections specialists, and information for patients themselves. Data is collected within participating Trusts for patients who have been admitted to acute/general medicine. Mortality (death) and antibiotic use in patients admitted to general medicine before and after its introduction using data from electronic hospital records is compared from admission to 90 days later. In some Trusts, individual patients or carers, as well

as healthcare professionals involved in the intervention, are invited to take part in a brief interview to find out what they thought about the intervention. Patients are also asked to complete a brief anonymous questionnaire (paper or online).

What are the possible benefits and risks of participating?
There are no direct benefits or risks with participating.

Where is the study run from?
This study is being run by the University of Oxford (UK) and takes place in NHS trusts (UK).

When is the study starting and how long is it expected to run for?
March 2016 to August 2023

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

Who is the main contact?
Prof Sarah Walker, sarah.walker@ndm.ox.ac.uk

Study website
http://modmedmicro.nsms.ox.ac.uk/ark/

Contact information

Type(s)
Public

Contact name
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Additional identifiers

EudraCT/CTIS number
Nil known

IRAS number

ClinicalTrials.gov number
Nil known

Secondary identifying numbers
CPMS 33360

Study information

Scientific Title
Antibiotic Review Kit for Hospitals (ARK-Hospital)

Study objectives
The aim of this study is to test a package of strategies developed specifically to help doctors, nurses, pharmacists and patients stop antibiotics in hospital when they are no longer needed.

Ethics approval required
Old ethics approval format

Ethics approval(s)
South Central - Oxford C Research Ethics Committee, 16/03/2017, ref: 17/SC/0034

Study design
Randomized; Both; Design type: Process of Care, Psychological & Behavioural, Validation of investigation /therapeutic procedures

Primary study design
Interventional

Secondary study design
Randomised controlled trial

Study setting(s)
Hospital

Study type(s)
Treatment

Participant information sheet
Not available in web format, please use the contact details below to request a patient information sheet

Health condition(s) or problem(s) studied
Antibiotic resistance

Interventions
This study consists of a behavioural intervention delivered to healthcare professionals involved in antibiotic prescribing or administration in adult inpatients admitted to acute/general medicine at different NHS Trusts. The intervention package includes internet-based education, training and standard systems to help doctors review patients, regular support from pharmacists or infections specialists, and materials for patients themselves.

First, the package is tested in one hospital to make sure that it is practical ('feasibility study'). It is then implemented in one to three more hospitals, testing how many people use it and

improving the package ('internal pilot'). If specific criteria are met, the package is implemented in 36 hospitals in total ('main trial'). The study compares mortality and antibiotic use in patients admitted to general medicine in each Trust before and after its introduction using data from electronic hospital records from admission to 90 days later. Each Trust therefore acts as its own control, with data from before intervention implementation compared to data after intervention implementation. Historical data from 1 April 2016 up until 12 months after the last Trust implements the intervention is used.

The 'main trial' uses a Trust (cluster)-randomised stepped-wedge design in which interventions are successively implemented across different Trusts over time. Randomisation is stratified by the calendar date on which the Trust joined the network (block size of 6). Each block is sequentially randomised (in order of block dates of joining the network) using computer-generated random numbers to a different target implementation date, initially over 2 month blocks (i.e. three Trusts implementing the intervention per month).

Individual patients are not be consented for this data collection. In some Trusts, individual patients or carers, as well as healthcare professionals involved in the intervention, are invited to take part in a brief interview to find out what they thought about the intervention. Patients are also asked to complete a brief anonymous questionnaire (paper or online).

Intervention Type
Behavioural

Primary outcome measure
Feasibility phase:
1. Acceptability of the intervention for healthcare professionals and patients are assessed through qualitative process evaluation at the end of the three month feasibility trial
2. Barriers to implementation are assessed through qualitative process evaluation at the end of the three month feasibility trial

Pilot phase:
Uptake of the online training component of the intervention is measured by the proportion of locally identified and prespecified essential individuals who complete the online training (recorded electronically) at three months of being invited to complete the training

Main trial:
1. Effect of introducing the intervention on the 30-day mortality post-admission is measured using death rates from hospital records at 30 days after admission to the acute/general medicine unit
2. Effect of introducing the intervention on the antibiotic exposure per acute/general medical admission is measured using the defined-daily-doses (DDD) of antibiotics per acute/general medical admission in the electronic hospital prescribing records at each admission and discharge

Secondary outcome measures
Pilot phase:
1. Uptake of the ARK 'review and revise' procedure within the intervention is measured using the proportion of regularly audited antibiotics prescriptions which document the ARK classification criteria at three months of being invited to complete the training.
2. Antibiotic exposure per acute/general medical admission before and after introducing the intervention is measured using the DDD of antibiotics per acute/general medical admission in the electronic hospital prescribing records at hospital admission and discharge

Main trial:
1. Effect of introducing the intervention on antibiotic exposure using different metrics i measured using the DDD per occupied bed-day, days on antibiotics per admission and bed day (length-of-therapy (LOT)), antibiotic days per admission and bed-day (days-of-therapy, DOT), carbapenem DDD, DOT and LOT per admission and per bed-day) at each admission and discharge.
2. Effect of introducing the intervention on adverse outcomes is measured using the ICU admission during current admission, total length-of-stay (hours), antibiotic restart after discontinuation, re-admission in the 30 days after discharge, C. difficile diarrhoea, mortality over the longer-term using repeated cross-sectional surveys at current admission, re-admissions, up to 30 days post-discharge and for 90 days post admission (for mortality)
3. Impact of the intervention on the fecal flora is measured using the proportion of discarded fecal samples from medical inpatients from which extended spectrum beta-lactamase (ESBL)-carrying Enterobacteriaceae can be isolated during hospital stay
4. Cost-effectiveness is measured using resource-utilisation and costs during hospital admission and 30 days post discharge
5. Uptake and acceptability of the online training component of intervention is measured using the proportion of locally identified and prespecified essential individuals who drive prescribing decisions for acute/general medical inpatients at the Trust who complete the online training (recorded electronically) within three months of the invitation to complete the training
6. Quantify uptake of the ARK 'review and revise' procedure within the intervention is measured using the proportion of regularly audited antibiotics prescriptions which document the ARK classification criteria within three months of the invitation to complete the training

Overall study start date
01/03/2016

Completion date
31/08/2023

Eligibility

Key inclusion criteria
NHS Trusts:
1. Acute or district general NHS Trust admitting patients to acute/general medicine
2. Willing to implement the intervention in healthcare professionals involved in antibiotic prescribing or administration in adult acute/general medicine, and able to identify a local ‘champion’ to lead this
3. Able to provide the required routine electronic data on adult patients admitted to acute /general medicine over the required time periods

Participant level for patient/carer interviews that form part of the process evaluation:
1. Participant is willing and able to give informed consent for participation in the interview study
2. Male or female, aged 18 years or above
3. Admitted to acute/general medicine
4. Has received a course of antibiotic treatment started in hospital in the last 7-14 days
5. Either the patient themselves, or a close friend or family member who supported the patient during their inpatient stay and antibiotic treatment

Participant type(s)
Patient

Age group
Adult

Lower age limit
18 Years

Sex
Both

Target number of participants
36 Trusts

Total final enrolment
36

Key exclusion criteria
Not meeting inclusion criteria.

Date of first enrolment
18/04/2017

Date of final enrolment
01/09/2019

Locations

Countries of recruitment
England

United Kingdom

Study participating centre
Royal Sussex County Hospital
Eastern Road
Brighton
United Kingdom
BN2 5BE

Sponsor information

Organisation
University of Oxford

Sponsor details

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Sponsor type
University/education

ROR
https://ror.org/052gg0110

Funder(s)

Funder type
Government

Funder Name
National Institute for Health Research

Alternative Name(s)
National Institute for Health Research, NIHR Research, NIHRresearch, NIHR - National Institute for Health Research, NIHR (The National Institute for Health and Care Research), NIHR

Funding Body Type
Government organisation

Funding Body Subtype
National government

Location
United Kingdom

Results and Publications

Publication and dissemination plan
Planned publication in a high-impact peer reviewed journal.

Intention to publish date

30/08/2023

Individual participant data (IPD) sharing plan

The de-identified patient-level electronic health records (on over 7 million admissions) and hospital-level antibiotic use data used for this analysis was obtained from individual hospital organisations without permission for onward data sharing. It can be accessed either directly from the participating organisations or through the trial team if the participating organisations provide permission. De-identified patient-level admission data can also be accessed directly through an application to NHS Digital.

IPD sharing plan summary

Stored in non-publicly available repository, Available on request

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Protocol article	protocol	11/07/2019	15/07/2019	Yes	No
Results article		04/10/2022	10/10/2022	Yes	No
HRA research summary			28/06/2023	No	No
Statistical Analysis Plan	version 2.0	05/03/2020	22/12/2023	No	No
Other publications	Qualitative feasibility study	04/04/2020	06/05/2025	Yes	No
Other publications	Sub-study	16/03/2023	06/05/2025	Yes	No