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How should we tackle antimicrobial resistance in primary care? Lessons from the CAPC infection research group

Alastair Hay, Emily Brown, Christie Cabral, Polly Duncan, Ioana Fodor and Ashley Hammond

www.bristol.ac.uk/capc
@capcbristol

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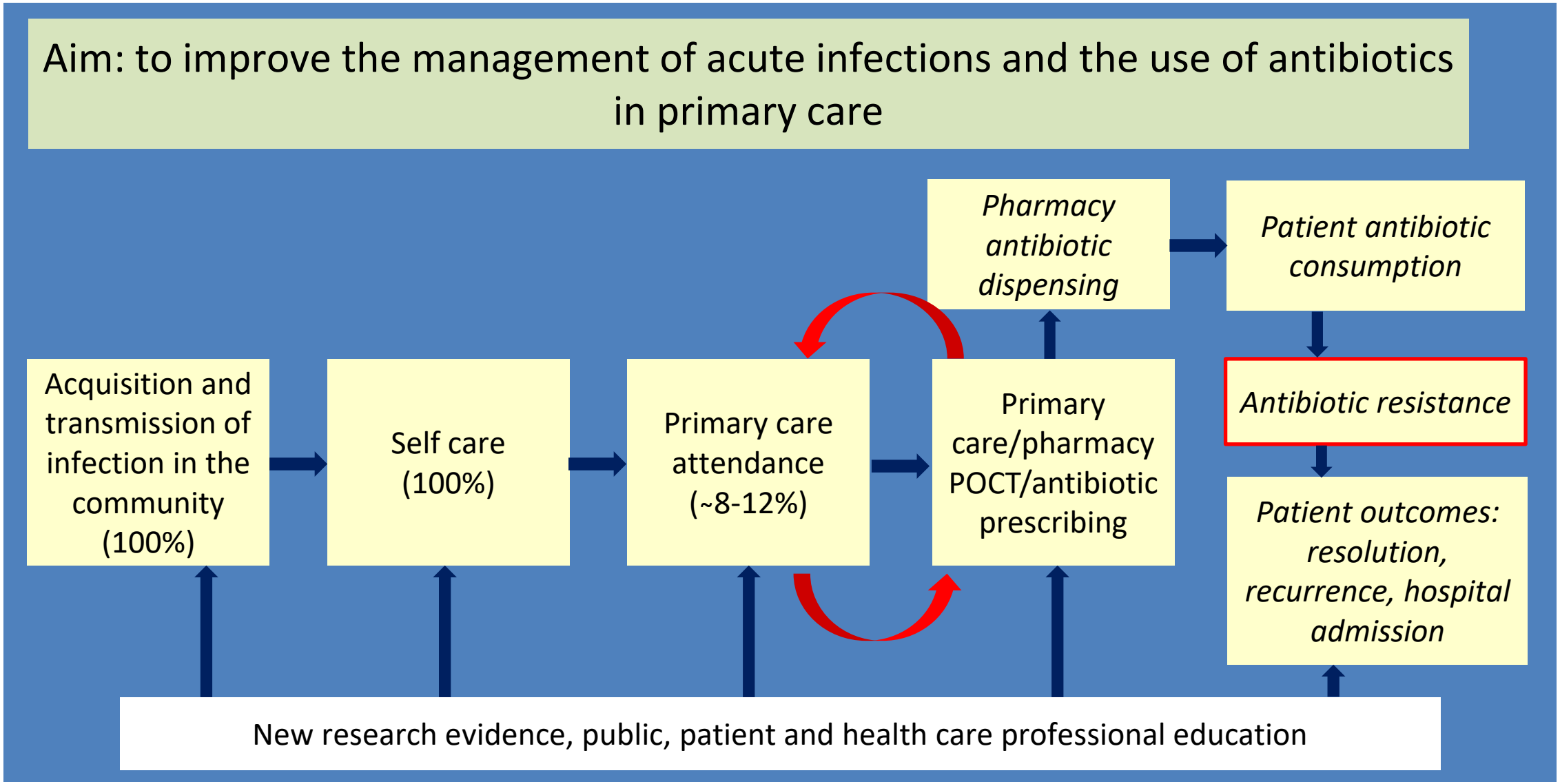

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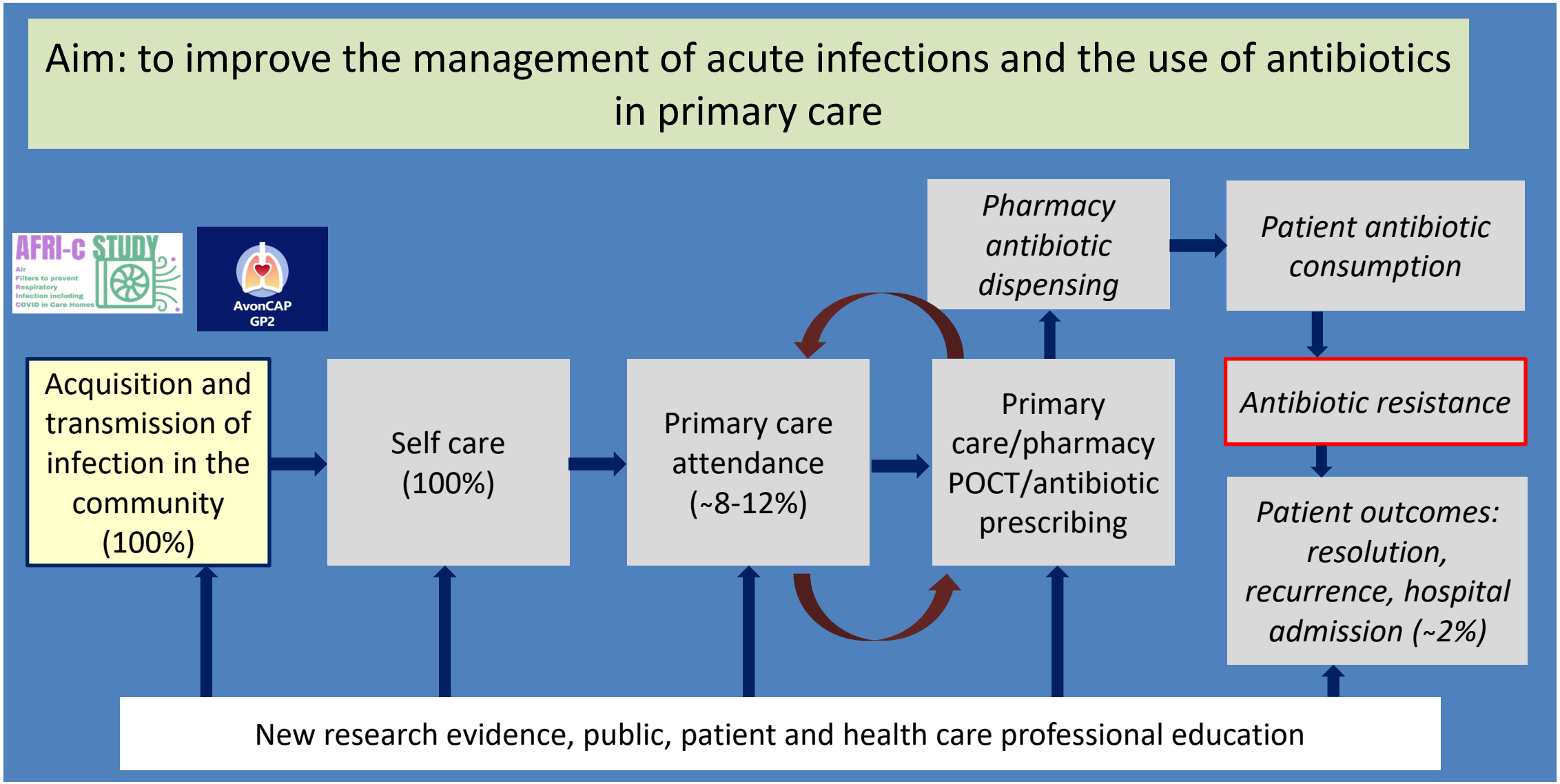

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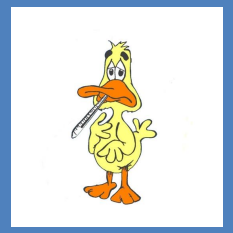
Aim: to improve the management of acute infections and the use of antibiotics in primary care



Acquisition and transmission of infection in the community (100%)

Self care (100%)

Primary care attendance (~8-12%)

Primary care/pharmacy POCT/antibiotic prescribing

Pharmacy antibiotic dispensing

Patient antibiotic consumption

Antibiotic resistance

Patient outcomes: resolution, recurrence, hospital admission (~2%)

New research evidence, public, patient and health care professional education

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SECONDARY CARE
1 to 2% admitted

PRIMARY CARE
~8% consult

COMMUNITY
Children experience 6 to 8 RTIs per annum

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RAPID IMMUNE TEST

Rapid-test

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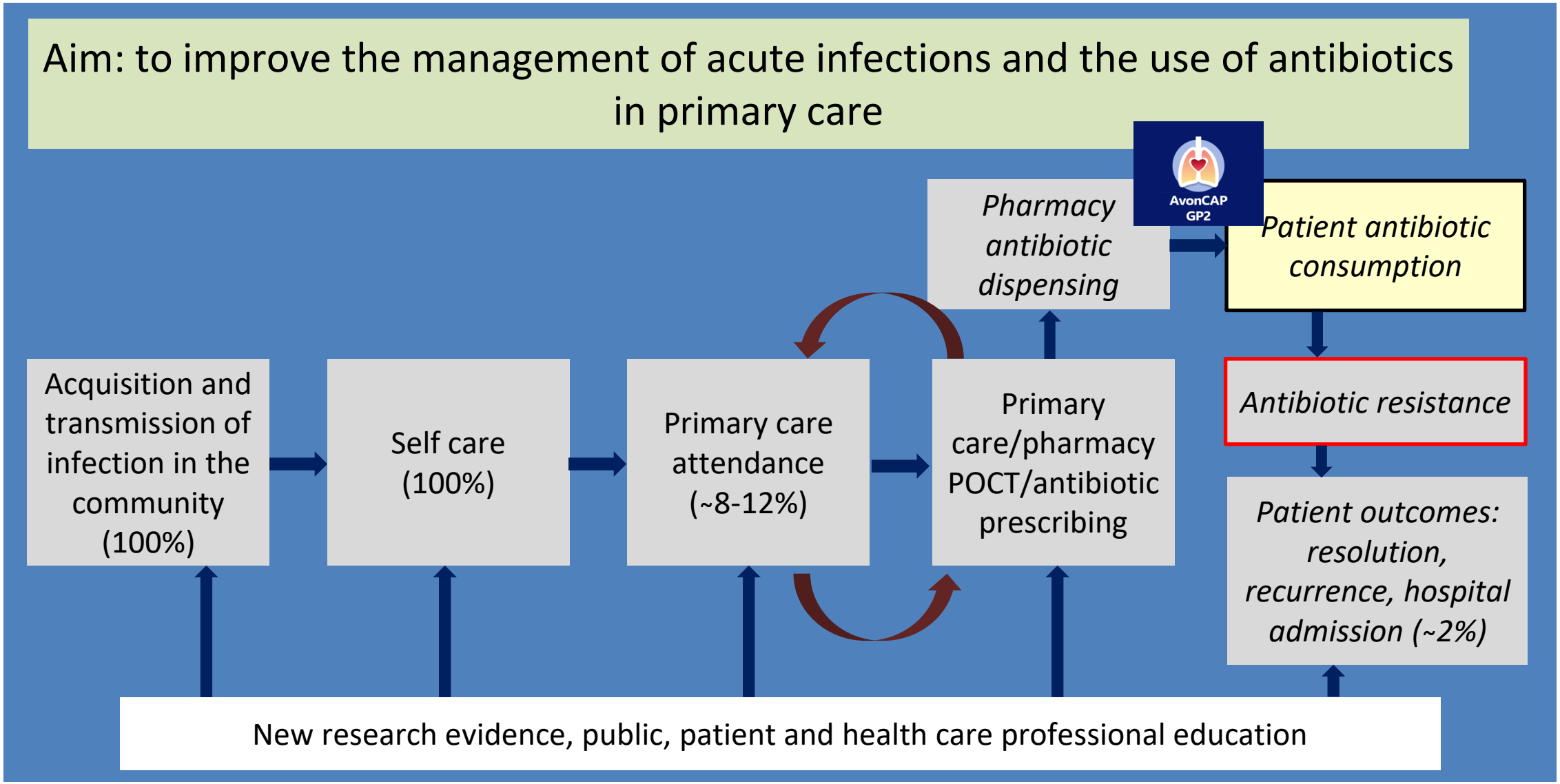

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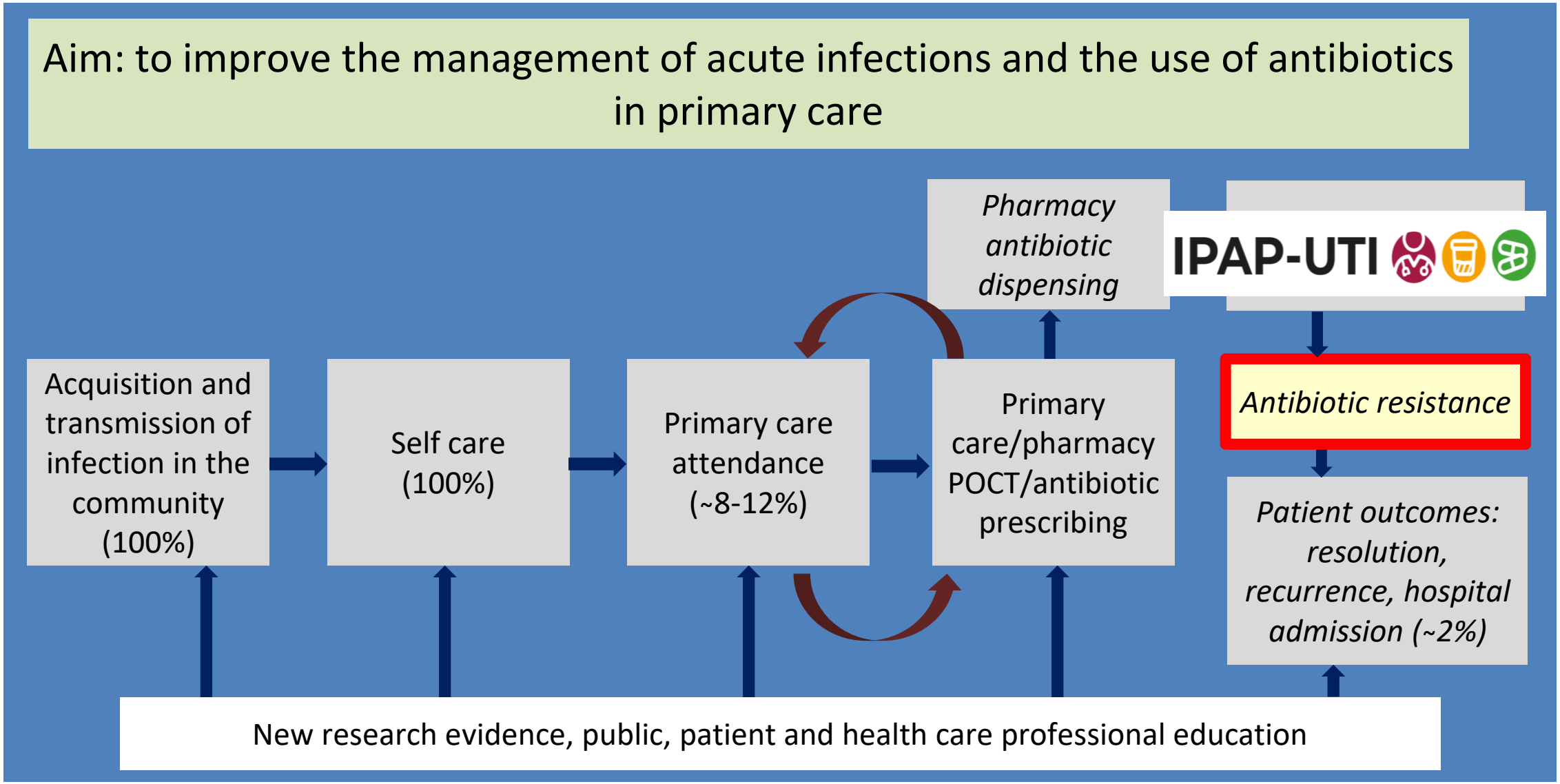

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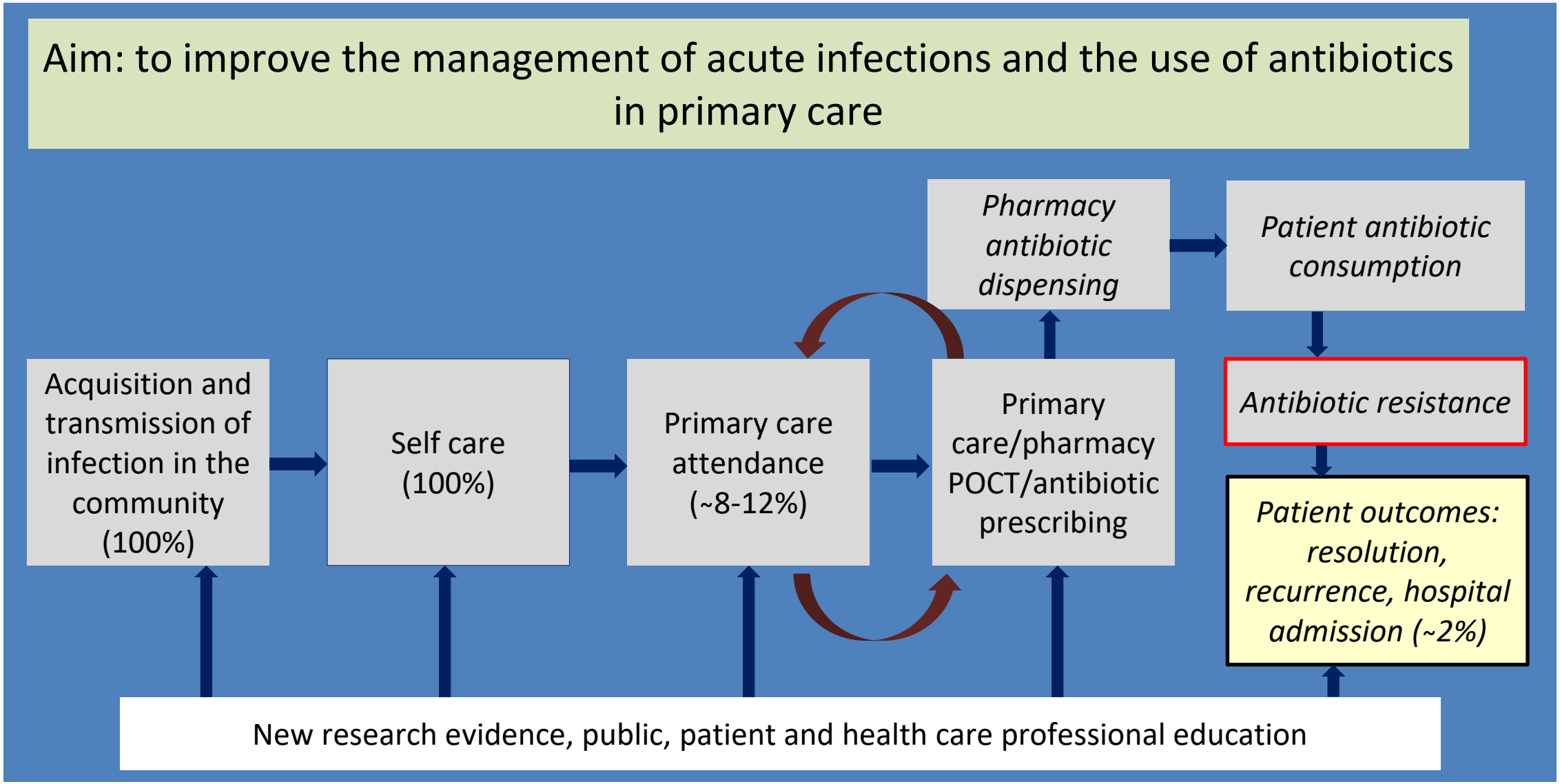

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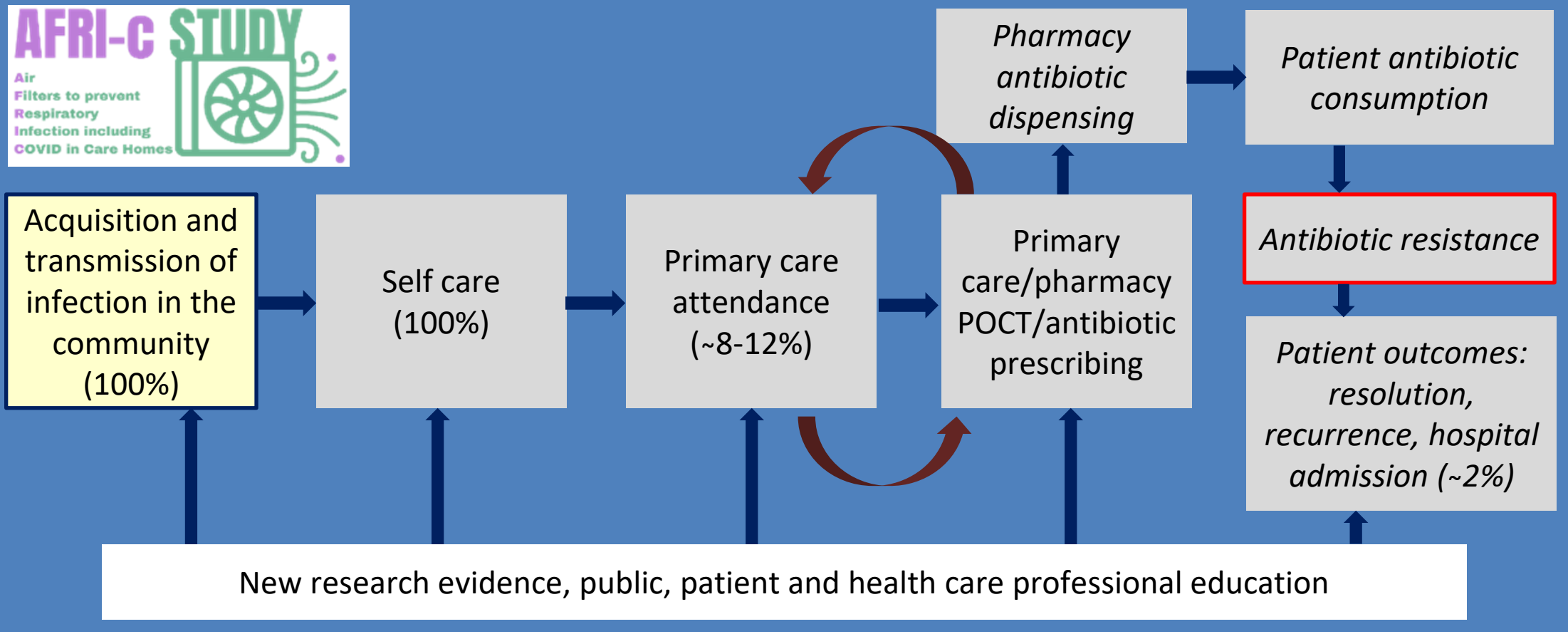

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AFRI-C STUDY

Air
Filters to prevent
Respiratory
Infection including
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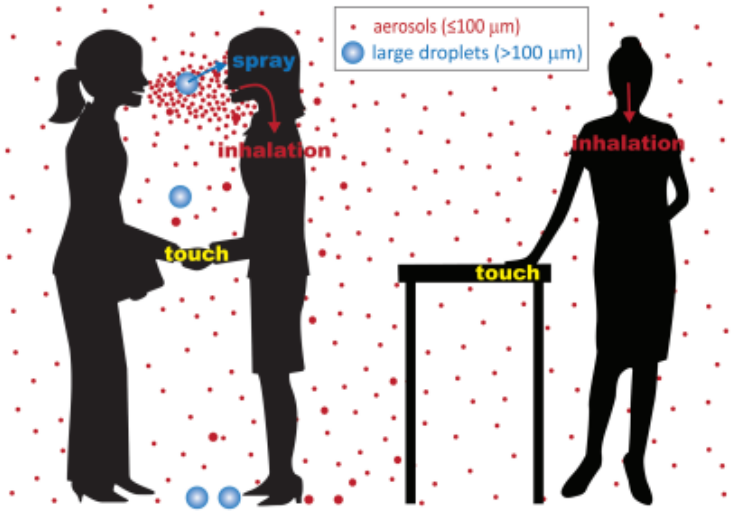

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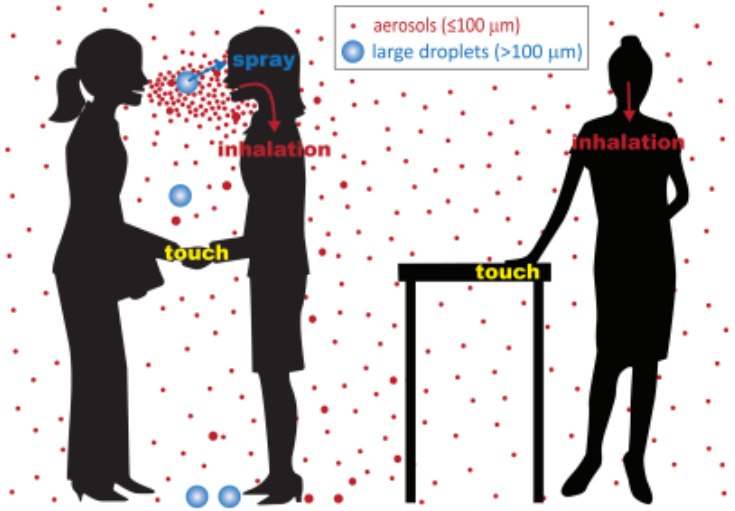

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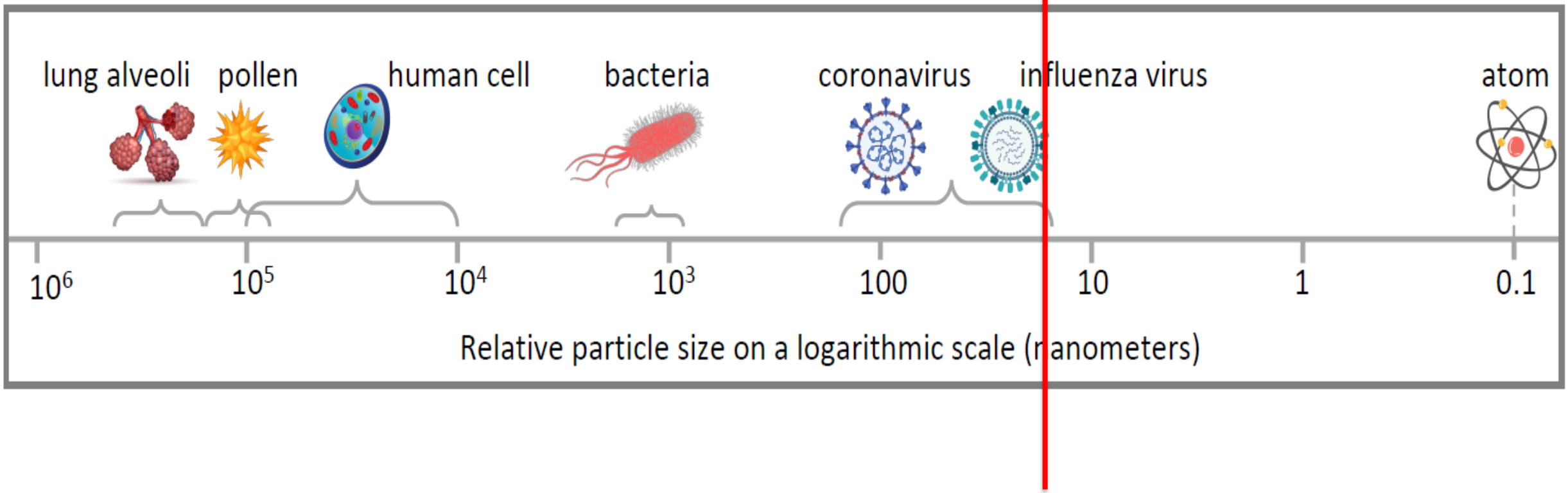

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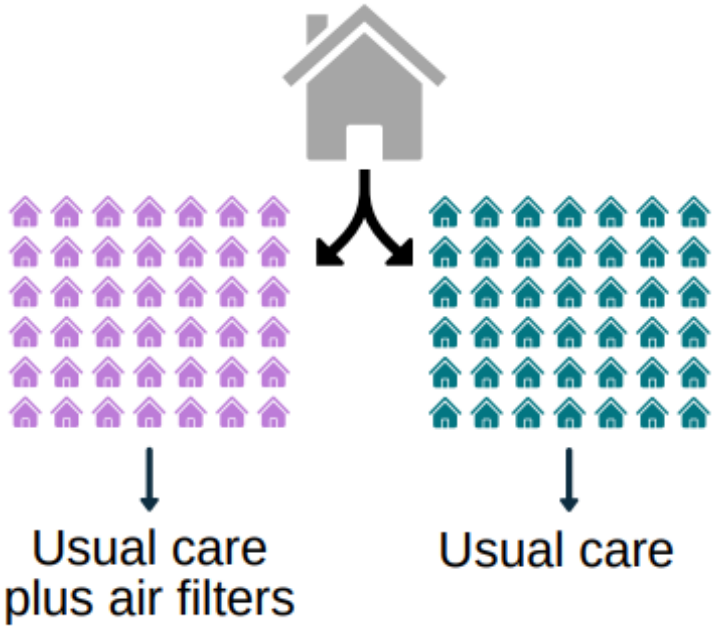
Design

Can using portable HEPA air filters reduce symptomatic respiratory infections in care home residents?

91 care homes and 1159 residents randomised (1:1)



Randomisation stratified by nursing care provision and socio-economic deprivation

Up to 5x communal filters + filters for consented residents' private rooms

Up to 16 residents consented (private and communal air filters)

Anonymous data collection up to 30 residents (communal air filters only)

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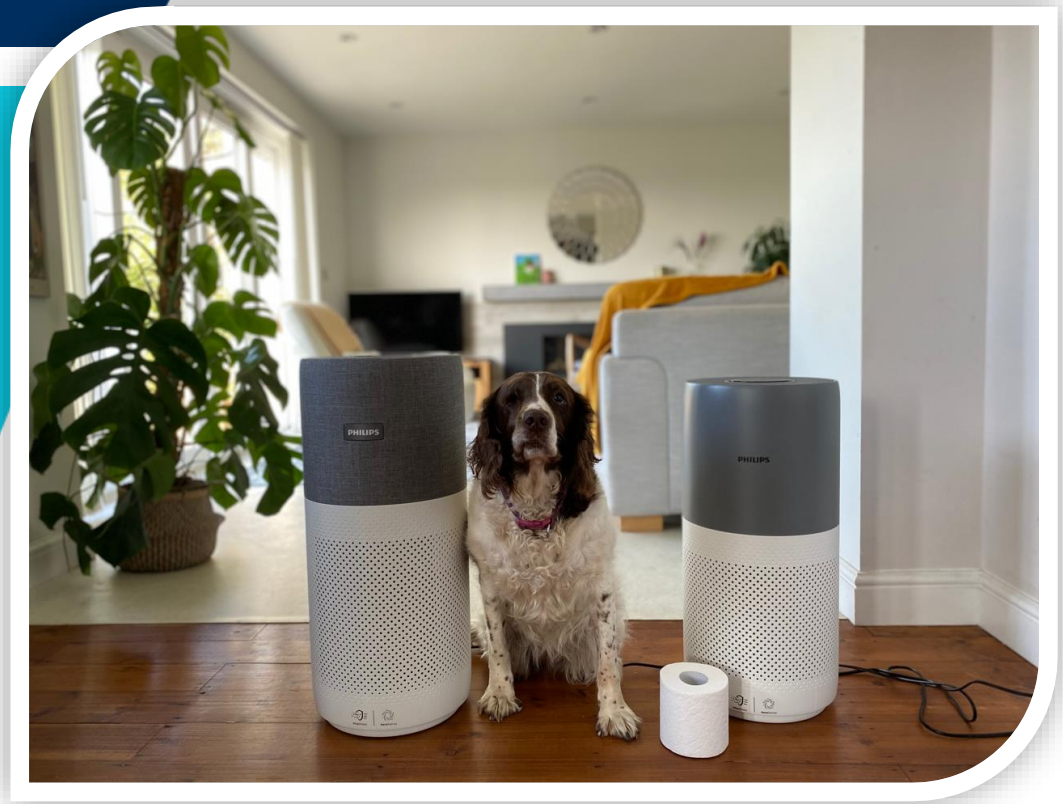
Intervention and outcomes



- Primary - the number of symptomatic winter respiratory infection episodes
- Secondary
  - Residents
    - Other infections
    - NHS contacts, including hospital admissions
    - Antibiotic prescribing
    - Falls
    - Perceived air quality
  - Saff
    - Sickness days off work
    - Perceived air quality

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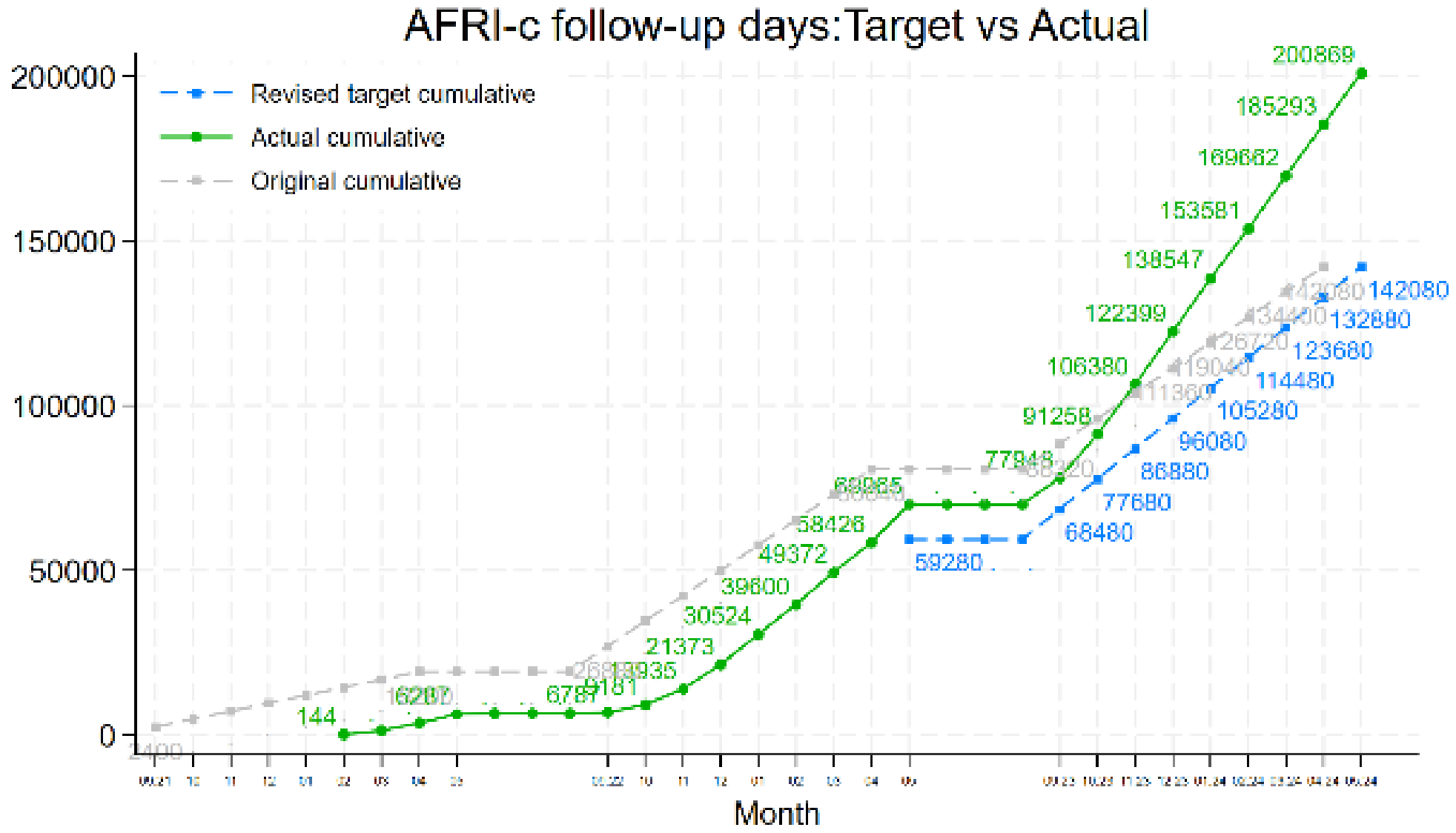
Progress update



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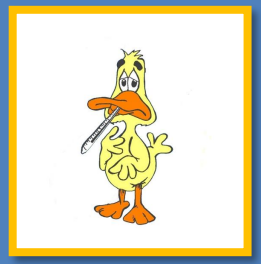

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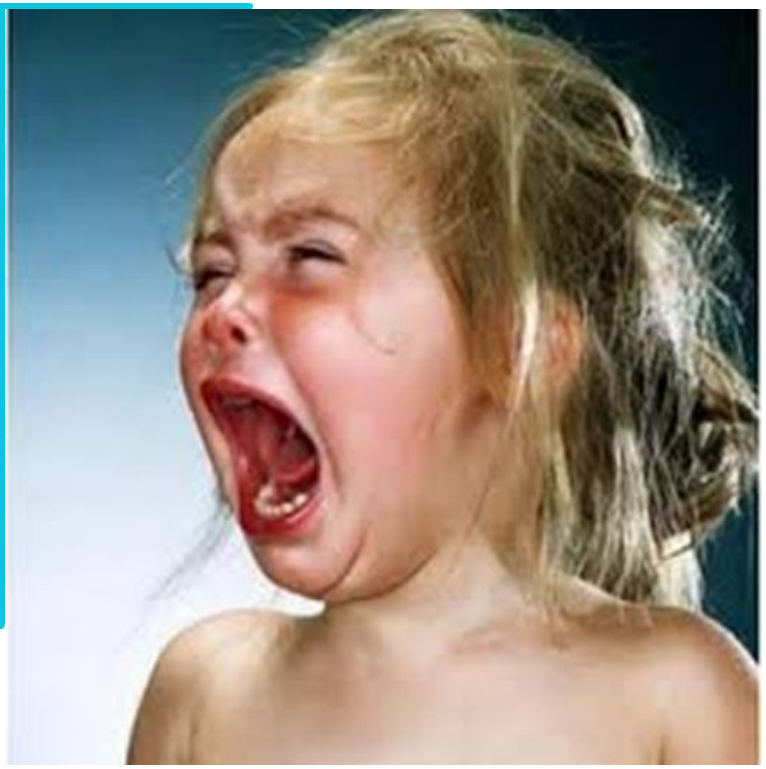
Self-care



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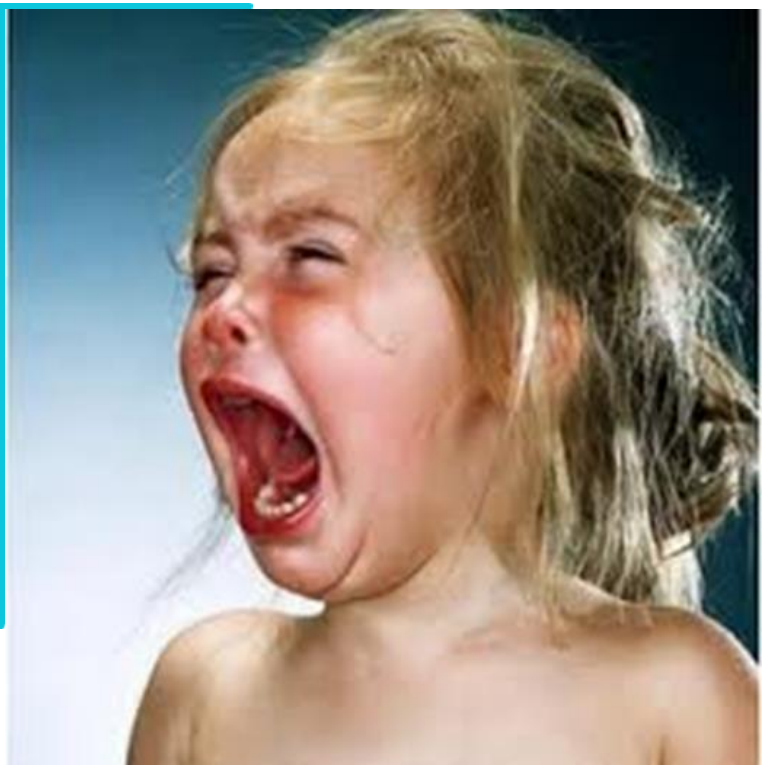
Self-care: fever



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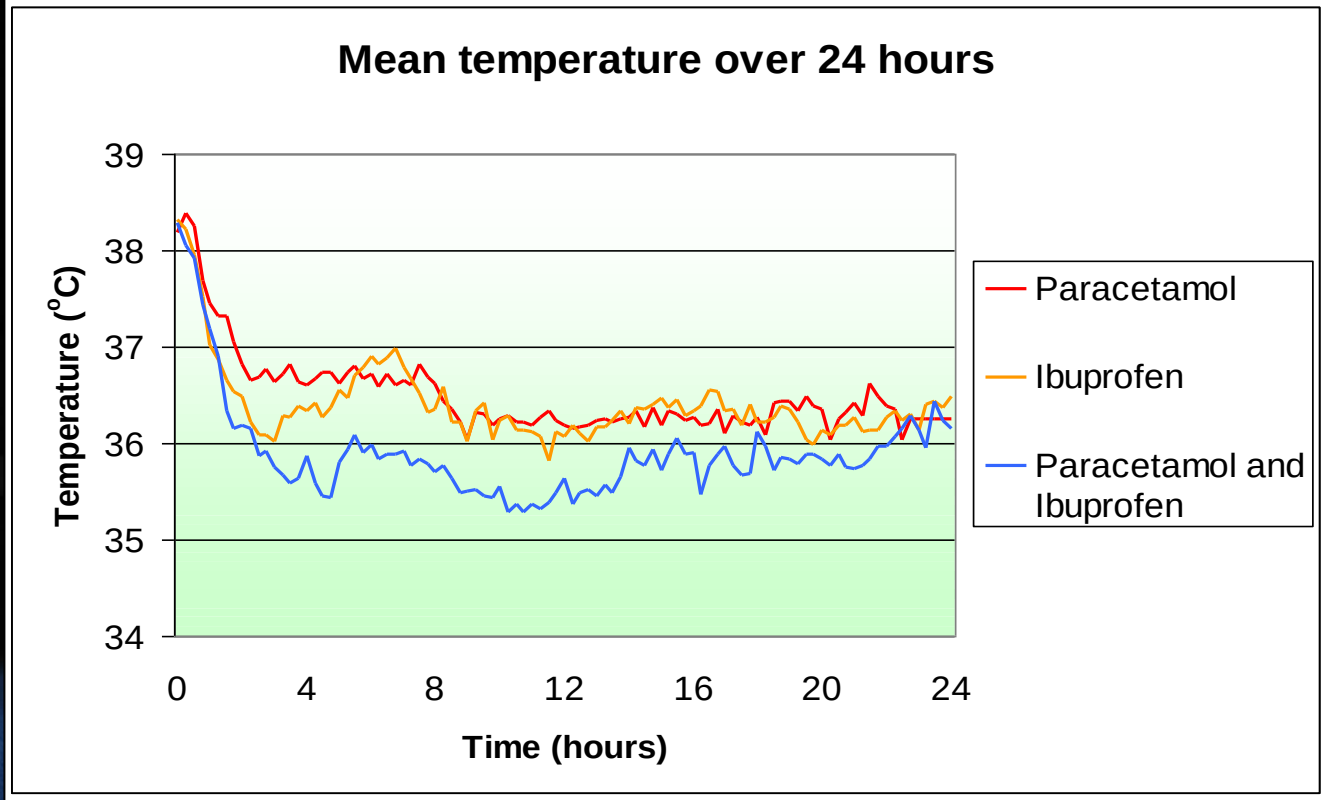

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BMJ

RESEARCH

Paracetamol plus ibuprofen for the treatment of fever in children (PITCH): randomised controlled trial

Alastair D Hay, consultant senior lecturer in primary health care,[1] Céire Costelloe, trial coordinator,[1] Niamh M Redmond, trial coordinator,[1] Alan A Montgomery, senior lecturer in primary care research,[1] Margaret Fletcher, reader in children's nursing,[2] Sandra Hollinghurst, senior lecturer in health economics,[1] Tim J Peters, professor of primary care health services research[1]

[1]Academic Unit of Primary Health Care, NIHR National School for Primary Care Research, Department of Community Based Medicine, University of Bristol, Bristol BS8 2AA

[2]Faculty of Health and Social Care, University of West England, Bristol

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Cite this as: *BMJ* 2008;337:a1302
doi:10.1136/bmj.a1302

ABSTRACT

Objective To investigate whether paracetamol (acetaminophen) plus ibuprofen are superior to either drug alone for increasing time without fever and the relief of fever associated discomfort in febrile children managed at home.

Design Individually randomised, blinded, three arm trial.

Setting Primary care and households in England.

Participants Children aged between 6 months and 6 years with axillary temperatures of at least 37.8°C and up to 41.0°C.

Intervention Advice on physical measures to reduce temperature and the provision of, and advice to give, paracetamol plus ibuprofen, paracetamol alone, or ibuprofen alone.

Main outcome measures Primary outcomes were the time without fever (<37.2°C) in the first four hours after the first dose was given and the proportion of children reported as being normal on the discomfort scale at 48 hours. Secondary outcomes were time to first occurrence of normal temperature (fever clearance), time without fever over 24 hours, fever associated symptoms, and adverse effects.

Results On an intention to treat basis, paracetamol plus ibuprofen were superior to paracetamol for less time with fever in the first four hours (adjusted difference 55 minutes, 95% confidence interval 33 to 77; P<0.001) and may have been as good as ibuprofen (16 minutes, −7 to 39; P=0.2). For less time with fever over 24 hours, paracetamol plus ibuprofen were superior to paracetamol (4.4 hours, 2.4 to 6.3; P<0.001) and to ibuprofen (2.5 hours, 0.6 to 4.4; P=0.008). Combined therapy cleared fever 23 minutes (2 to 45; P=0.025) faster than paracetamol alone but no faster than ibuprofen alone (−3 minutes, 18 to −24; P=0.8). No benefit was found for discomfort or other symptoms, although power was low for these outcomes. Adverse effects did not differ between groups.

Conclusion Parents, nurses, pharmacists, and doctors wanting to use medicines to supplement physical measures to maximise the time that children spend without fever should use ibuprofen first and consider the relative benefits and risks of using paracetamol plus ibuprofen over 24 hours.

Trial registration Current Controlled Trials ISRCTN26362730.

INTRODUCTION

Fever is a normal part of childhood illness, affecting around 70% of preschool children yearly.[1] It can be miserable for the child, cause anxiety for parents,[2] and be expensive for health services. Up to 40% of preschool children see a health professional for a febrile illness each year.[1] Although fever is considered by many to be an advantageous evolutionary byproduct of the host response to infection, and as such should not be treated,[3] the use of antipyretics is widespread. The reasons for treating fever are contested and not necessarily evidence based but include minimising discomfort, controlling the fever, and preventing febrile convulsions.

Options for treating fever include physical measures (taking cool fluids and dressing lightly) and the antipyretic drugs paracetamol (acetaminophen) and ibuprofen. Evidence for physical measures is now redundant as it mostly pertains to tepid sponging,[4] which is no longer recommended.[5] Paracetamol and ibuprofen have both been shown to be superior to placebo[6-8] and ibuprofen superior to paracetamol[9] for the relief of fever. Given that the drugs have different mechanisms of action[10] it is possible that they are more effective together than when used alone, but the evidence to date is sparse and conflicting. Five published trials[11-15] mostly tested the effects of single doses at selected time points (which can arbitrarily advantage one drug because of the difference in times to maximum effect[16]), were largely done in secondary care, and reached conflicting conclusions. Recently published UK guidelines[5] advise the use of either drug (no preference stated) for children with fever who are unwell or distressed and state that owing to the lack of evidence the drugs should not be used together or alternately.

We carried out a community based, three arm, blinded, randomised controlled trial to investigate the

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Bringing to life the best in women's health care

RCPCH Royal College of Paediatrics and Child Health
Leading the way in Children's Health

Feverish illness in children: assessment and initial management in children younger than 5 years

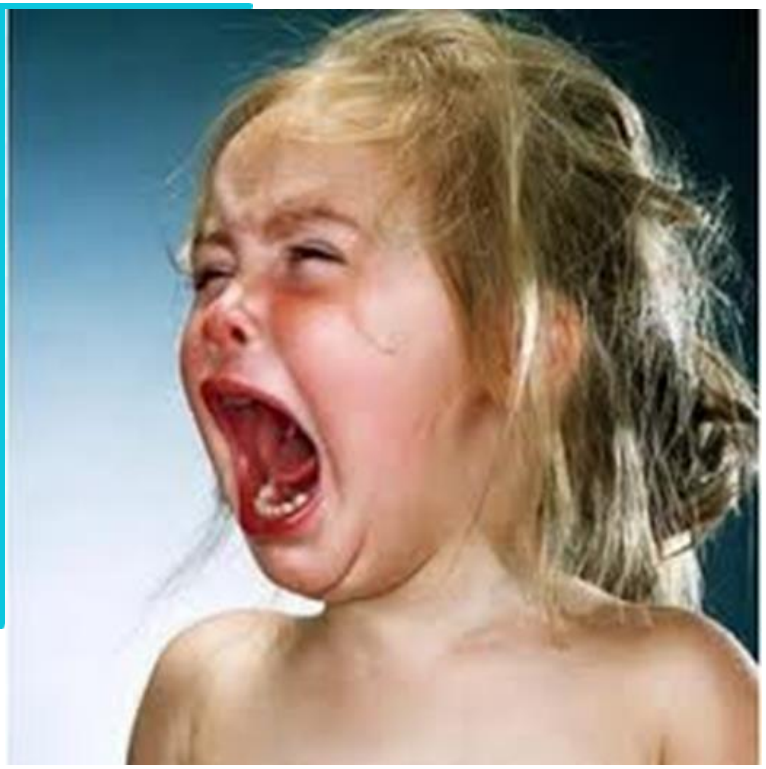
May 2013

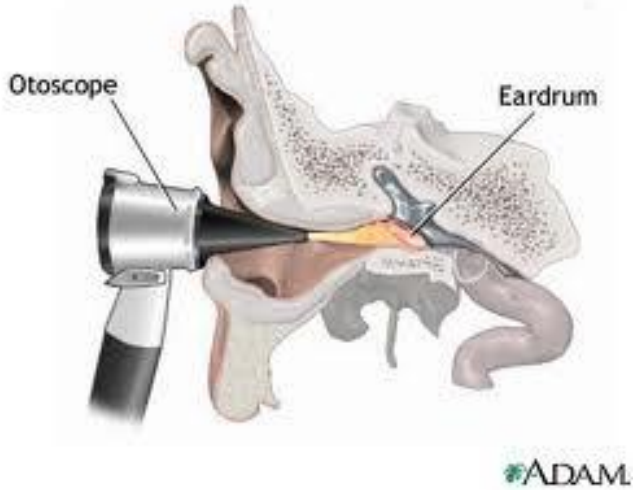
NICE Clinical Guideline

National Collaborating Centre for Women's and Children's Health

NHS Evidence accredited provider
NHS Evidence - provided by NICE
www.evidence.nhs.uk

Self-care: ear pain





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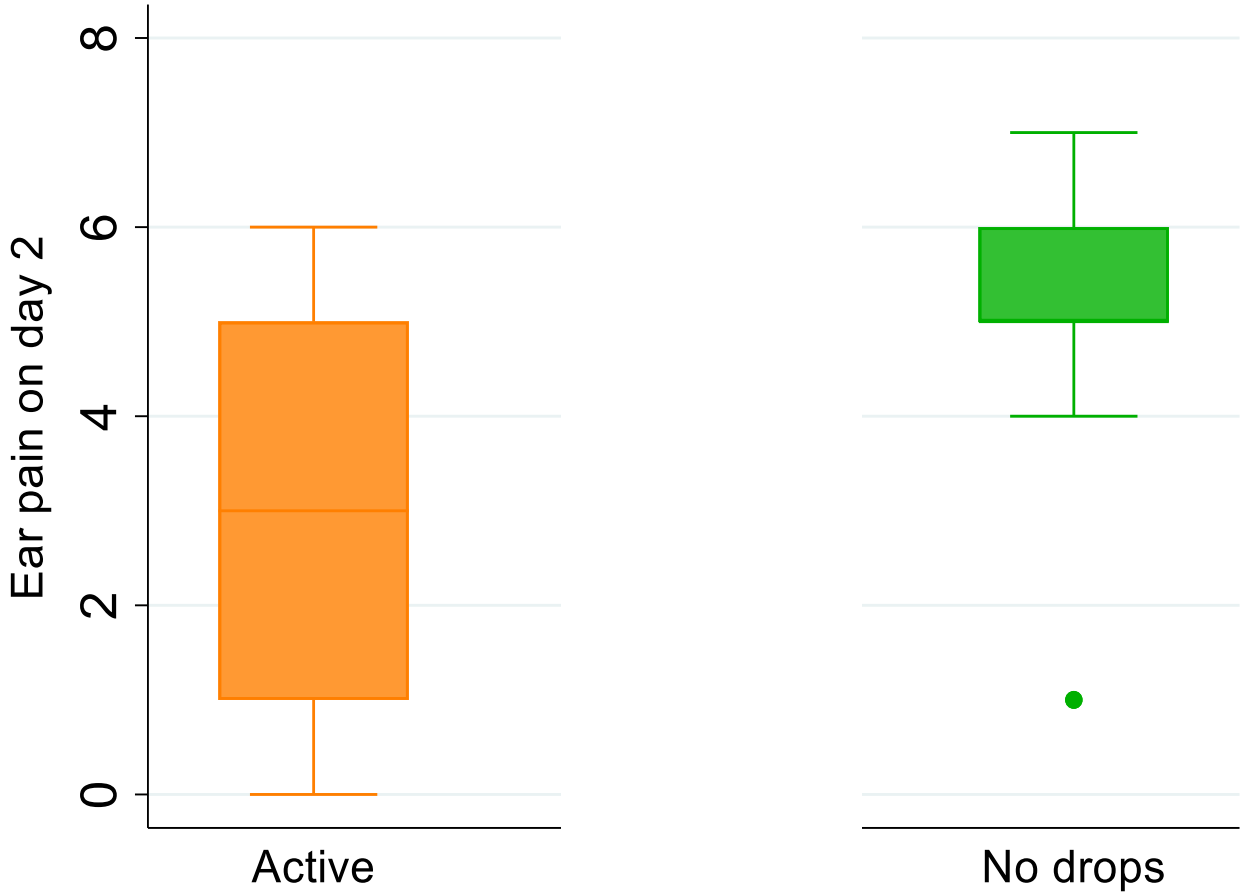
Ear pain at 24-36 hours



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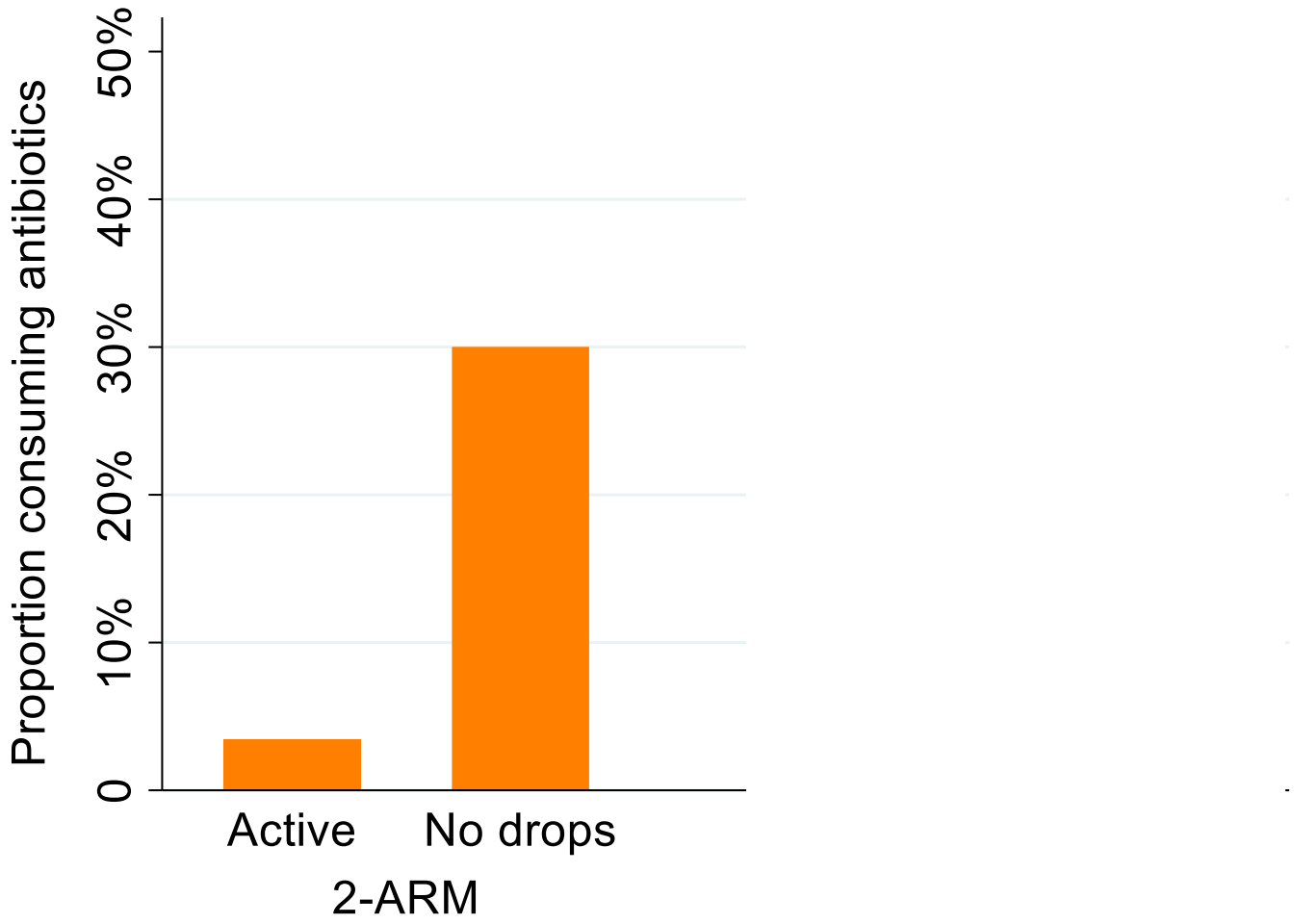
Antibiotic consumption at day 8



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Check for updates

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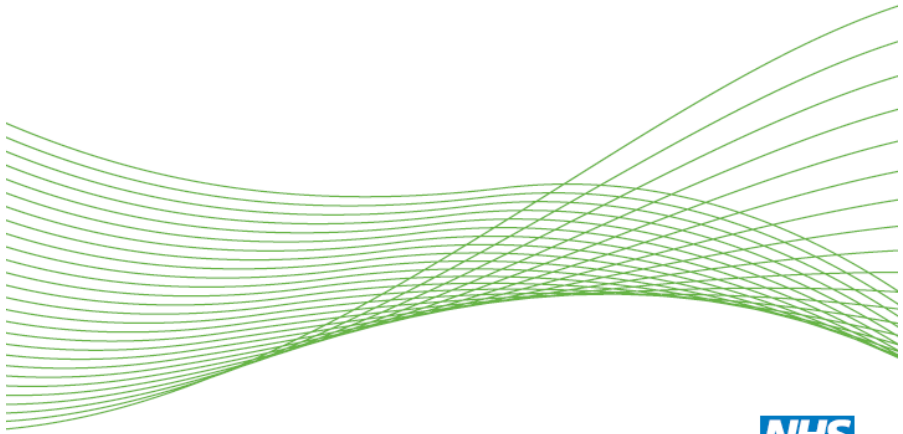

DOI 10.3310/hta23340

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Otitis media (acute): antimicrobial prescribing

NICE National Institute for Health and Care Excellence

Acute otitis media

Otorrhoea (discharge after eardrum perforation) in any child or young person

or

Under 2 years with infection in both ears?

No

- Offer regular doses of paracetamol or ibuprofen for pain
- Consider eardrops containing an anaesthetic and an analgesic for pain
- Consider no antibiotic or a back-up antibiotic prescription

When no antibiotic given, advise:

- antibiotic is not needed
- seeking medical help if symptoms worsen rapidly or significantly, do not start to improve after 3 days or the child or young person becomes very unwell

With a back-up antibiotic prescription, advise:

- antibiotic is not needed immediately
- use prescription if no improvement in 3 days or symptoms worsen
- seeking medical help if symptoms worsen rapidly or significantly, or the child or young person becomes very unwell

Yes

- Offer regular doses of paracetamol or ibuprofen for pain
- Consider no antibiotic, a back-up antibiotic prescription or an immediate antibiotic
- If an immediate antibiotic is not given, and there is no eardrum perforation or otorrhoea, consider eardrops containing an anaesthetic and an analgesic for pain

With an immediate antibiotic prescription, advise:

- seeking medical help if symptoms worsen rapidly or significantly, or the child or young person becomes very unwell

Advise:

- acute otitis media lasts about 3 days but can last up to 1 week

Reassess at any time if symptoms worsen rapidly or significantly, taking account of:

- other possible diagnoses
- any symptoms or signs suggesting a more serious illness or condition
- previous antibiotic use, which may lead to resistant organisms

If the child or young person:

is systemically very unwell, or

has symptoms and signs of a more serious illness or condition, or

has high risk of complications

- Offer an immediate antibiotic prescription

Refer to hospital if:

- severe systemic infection, or
- complications like mastoiditis

Non-antimicrobial treatments

- Offer regular doses of paracetamol or ibuprofen for pain. Use the right dose for the age or weight of the child at the right time, and use maximum doses for severe pain
- Consider eardrops containing an anaesthetic and an analgesic for pain if an immediate antibiotic is not given, and there is no eardrum perforation or otorrhoea
- Evidence suggests that decongestants or antihistamines do not help symptoms

Evidence on antibiotics

- Antibiotics make little difference to the number of children whose symptoms improve
- Antibiotics make little difference to the number of children with recurrent infections, short-term hearing loss or perforated eardrum
- Complications (such as mastoiditis) are rare with or without antibiotics
- Possible adverse effects include diarrhoea and nausea

Groups who may be more likely to benefit from antibiotics

- Children and young people with acute otitis media and otorrhoea (discharge following eardrum perforation)
- Children under 2 years with acute otitis media in both ears

March 2022

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March 2022

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NHS England

Community Pharmacy advanced service specification

NHS Pharmacy First Service

(Including the service previously known as the NHS Community Pharmacist Consultation Service (CPCS))

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Publication reference: PRN00936_i

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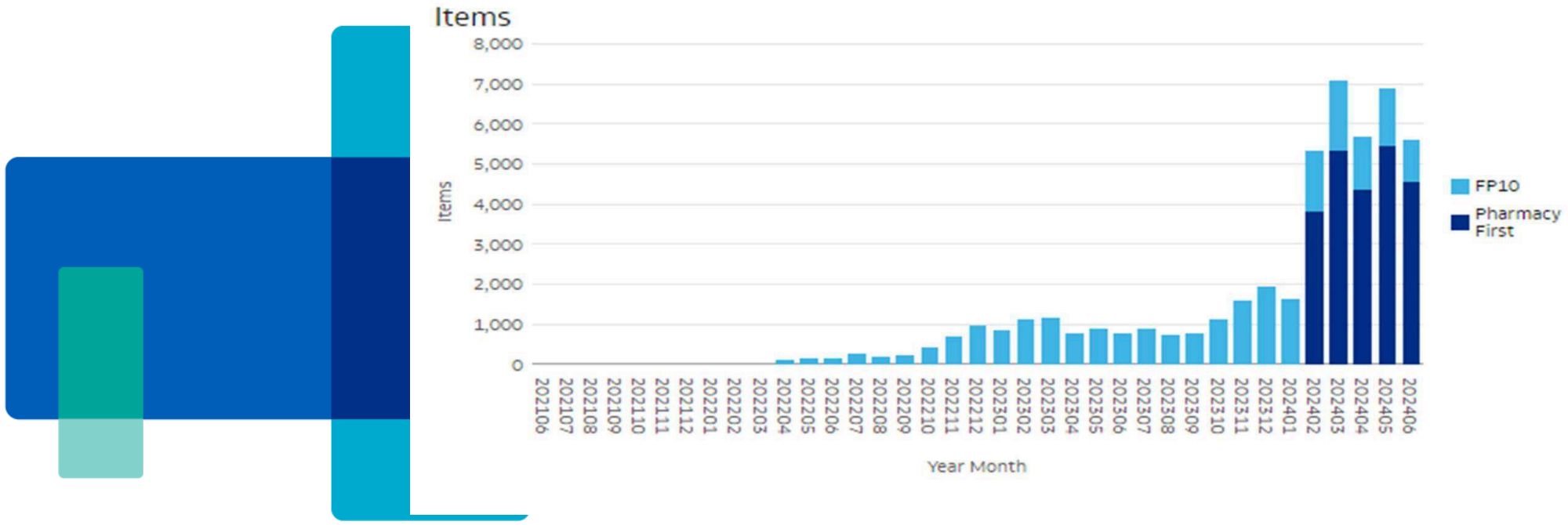

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Self care (100%)

Primary care attendance (~8-12%)

Primary care/pharmacy POCT/antibiotic prescribing

Pharmacy antibiotic dispensing

Patient antibiotic consumption

Antibiotic resistance

Patient outcomes: resolution, recurrence, hospital admission (~2%)

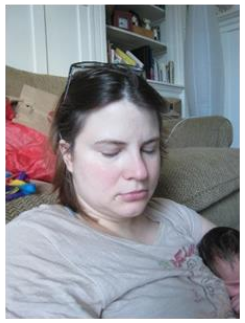
New research evidence, public, patient and health care professional education

Why do parents consult GP about a coughing child?

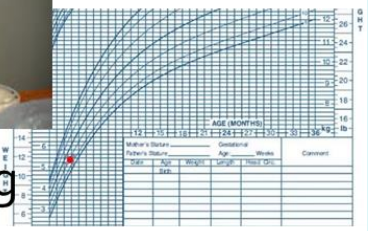
Does my child need to see the GP

Worrying symptoms

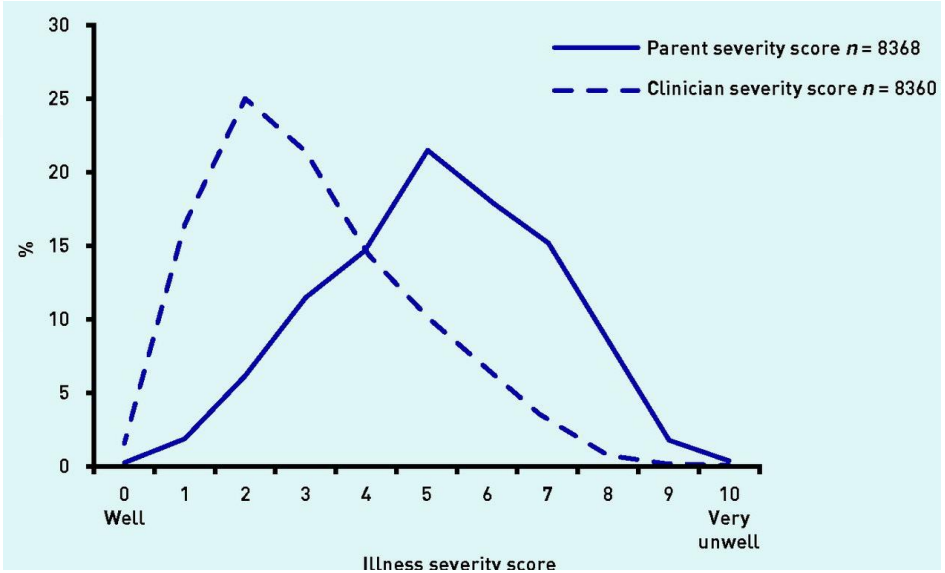
TARGET



Disrupted Sleep



Disrupted Eating



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Influence of clinical communication

CONKer Research Study

- Clinicians explanation of treatment decision:
  - Links viral diagnosis to lower severity
  - Links antibiotic prescription to higher severity & to indicator symptoms

GPs talking to parents:

"because I can hear that little noise in her chest, I'm going to give her some antibiotics"

"if the phlegm was yellowy, it's probably worth using an antibiotic"

"if she's still having temperatures [tomorrow] then that's gone on longer than I would expect with a viral thing, and I would want her to have antibiotics"

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Social constructions of child safety

Mothers:

“in terms of with children you can't be too careful really.”

"you just always like to rule it out, ... that it's not some infection [that needs Abx]"

GP:

“if they were, as a result of that not taking it [antibiotics], … to become more unwell, it's very difficult to justify having held it back."

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Caring for Babies & Children with Cough

- Co-designed website & leaflet
- 4 parent groups
  - South Asian
  - Somali
  - White British
  - Eastern European
- All low SES

Caring for children with COUGHS

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This leaflet contains information about how to look after a child who has a cough (not due to asthma).
For more detail see www.bristol.ac.uk/child-cough

COUGH

Coughs can last for 3-4 weeks and make your child feel quite unwell but will still get better by themselves.

'Noisy chests' or 'chesty coughs' are quite common when young children catch a cold and are not necessarily a sign of a 'chest infection'.

Healthy children typically get a cough 7-10 times a year and this is not a sign that there is anything wrong with their immune system.

DISTURBED SLEEP

Coughs will often wake your child in the night. When the child lies down, more of the mucus from the nose and throat runs downwards and your child coughs more to clear it.

Coughing is part of the body's defence system which helps keep the lungs clear and fight the illness. Unfortunately this can wake the child in the night but does not mean the illness is more severe.

For children over 1 year, a spoon of honey (perhaps in a warm drink) half an hour before bed may help them to wake less often.

For children over 2 years, vapour rubs (containing camphor, menthol and/or eucalyptus) may help children sleep better.

FEVER/HIGH TEMPERATURE

In children, a temperature of over 37.5°C is considered a fever.

Fever is a normal response to illness and does not harm children. It may even help to fight illness.

Children with a high temperature may be more likely to have a more severe illness, although most do not. Occasionally a child may have a fit. This shouldn't cause harm and treating the fever doesn't prevent it.

It is safe to use child paracetamol and ibuprofen to manage children's fever (and pain) for as long as needed. Follow the dosage on the bottle.

DRINKING/EATING LESS

Children often eat and drink less when they have normal childhood illnesses. Most children can go a few days without eating much and this will not affect their longer term growth and development.

All children need to drink regularly to avoid becoming dehydrated, especially if they are vomiting.

To help prevent dehydration, encourage your child to have sips of water.

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Safety-netting adapted from NICE traffic light

- A double-edged sword?

WHEN TO SEE THE DOCTOR

Arrange to see or speak to your doctor today if any of the following occur:

RAPID OR DIFFICULT BREATHING (DEPENDING ON AGE):

AGE OF CHILD	BREATHING RATE
Babies under 6 months	over 60 breaths per minute
Babies 6–12 months	over 50 breaths per minute
Children over 1 year	over 40 breaths per minute
Any age	Being short of breath (as if your child has been running) or is 'working hard' to breathe when resting
Any age	Skin between and below the ribs gets sucked in each time your child takes a breath

HIGH OR PERSISTENT FEVER (DEPENDING ON AGE OF CHILD):

AGE OF CHILD	TEMPERATURE
Babies under 3 months	38°C or more
Babies 3–6 months	39°C or more
Children over 6 months	over 37.5°C for more than 5 days
If your child has a fever fit, **call 999 or take them to A&E.**	

VOMITING (DEPENDING ON AGE):

AGE OF CHILD	SYMPTOMS
Babies under 3 months	Vomiting + fever of 38°C or above
Babies 3–6 months	Vomiting + fever of 39°C or above
Children over 6 months	Vomiting + fever + extremely drowsy or listless
Any age	Severe vomiting (child not able to hold down fluids for 8 hours or showing signs of dehydration)
Any age	Persistent vomiting (more than 2 days)

SKIN PALER THAN USUAL
If your child appears much paler than usual; hands and feet are very cold while their body is warm. **If skin, lips or tongue appear blue, call 999.**

PAIN
Pain in the chest (not when coughing) combined with fever and rapid breathing.

HARD TO WAKE / UNRESPONSIVE
Cannot be woken or wakes only slightly and then immediately goes back to sleep.

If your child wakes only with lots of stimulation,or is much less responsive to social stimulation (smiles and talking) than usual.

NOT FEEDING
Babies under 1 year: if your child stops feeding entirely.

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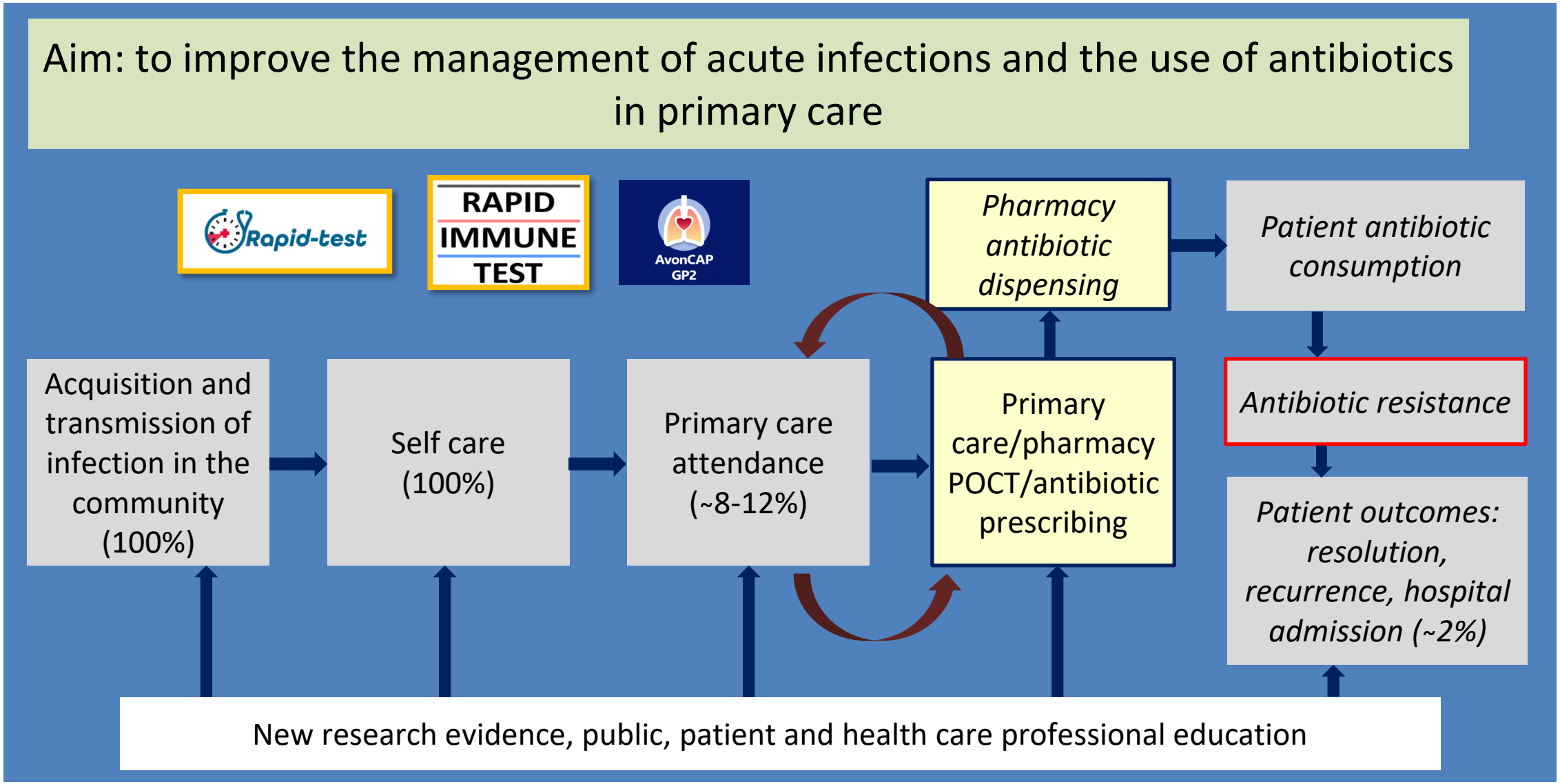
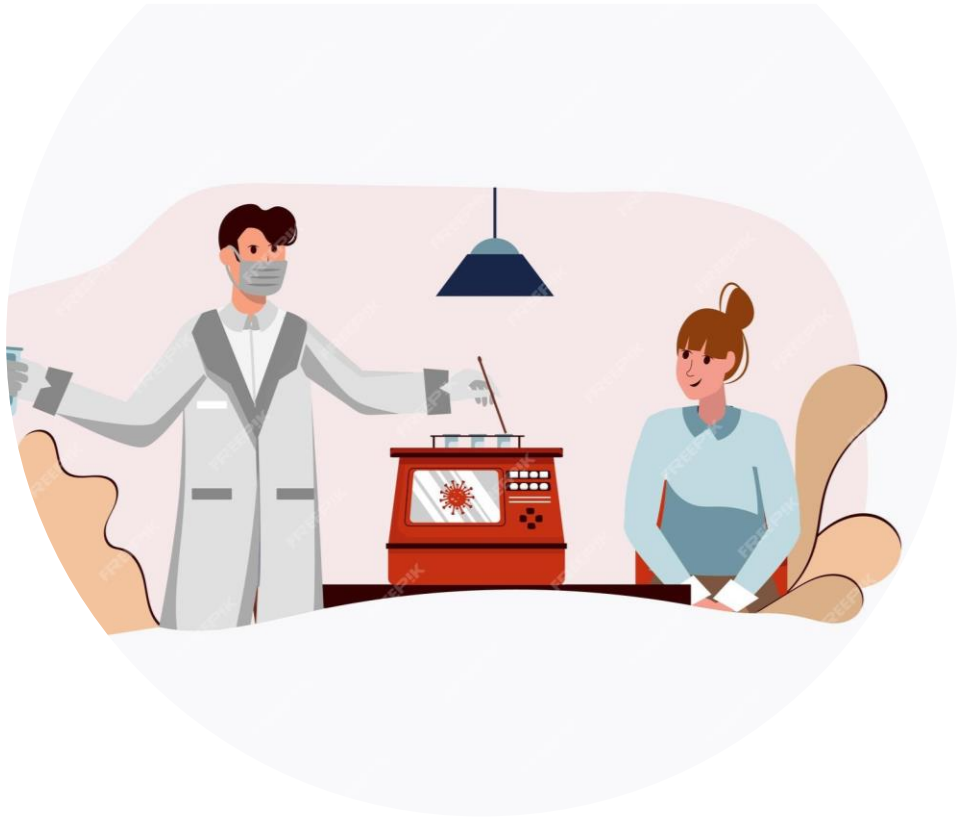


What are point-of-care tests (POCTs)?

- Can be used ‘at the point of care’ – in primary care
- Patient or a sample doesn’t need to go to the hospital or laboratory
- Rapid results
- POCT technology is rapidly evolving
- Focus on POCTs for respiratory tract infections (RTIs)



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Could POCTs help tackle AMR in primary care?

80% of NHS antibiotics are prescribed in primary care, at least 20% are unnecessary

Antibiotics are often prescribed for viral respiratory infections

Rapid POCTs might help

Evidence is needed for respiratory POCTs in primary care – e.g. accuracy, safety, impact on antibiotic use, cost-effectiveness, influence on consulting behaviours

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RAPID TEST trial

- Multi-centre, individually randomised trial
- 1:1 randomised to usual care or POCT

- Intervention: Biofire® FilmArray® Torch 1 system (microbiological POCT, POCT^{RM})
- Combined nasal/throat swab
- Biofire® FilmArray® Torch 1 system
- Uses PCR to detect:
  - Main respiratory viral pathogens (19)
  - Four atypical bacteria
- Does **not** test for
  - Typical bacteria
- Results in 45 minutes

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Objectives

- Primary clinical: to investigate if the use of a respiratory POCT^{RM} can reduce same-day antibiotic prescribing in adults and children presenting to primary care with RTIs
- Key clinical secondary: to investigate if the use of a respiratory POCT^{RM} changes participant reported symptom severity on days 2 to 4
- Primary mechanistic objective: to investigate if virus detection reduces same day antibiotic prescribing
- Qualitative objectives: to explore patient and clinician views on how POCT^{RM} could influence treatment decisions and future consulting

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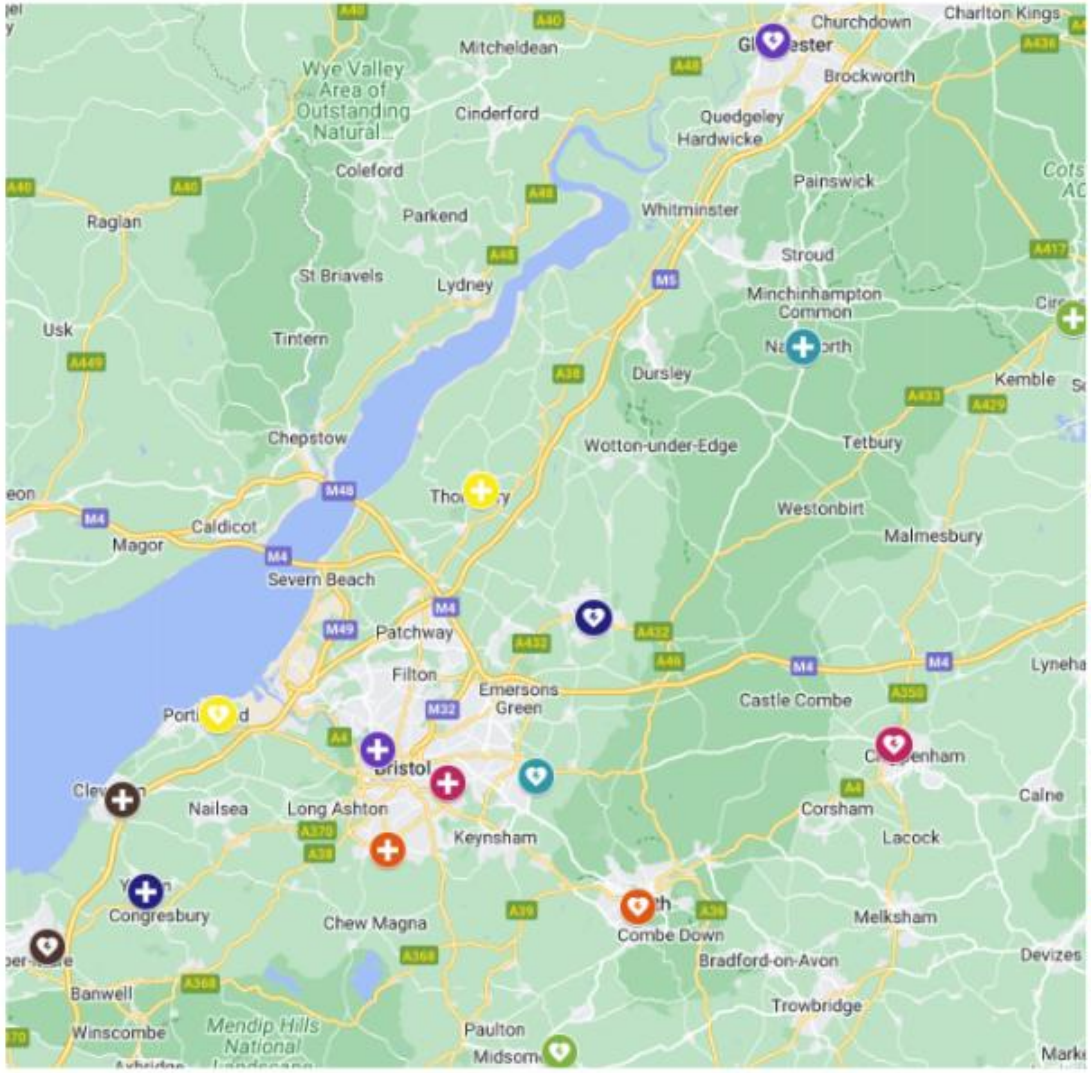
Site recruitment



RECRUITING SITES

The RAPID-Test team would like to say a big thank you to all our sites. We appreciate your hard work and are delighted to see lots of successful participant recruitment!

Winter 1	Winter 2
Mendip Vale Medical Practice	Locking Castle Medical Centre
Streamside Doctors Surgery	Heart of Bath
Nightingale Valley Practice	Hope House Surgery
Whiteladies Health Centre	Close Farm Surgery
Price's Mill Surgery	Severnside Medical Practice
Phoenix Health Group	Hathaway Medical Centre
Hartwood Healthcare	Harbourside Family Practice
Clevedon Medical Centre	West Walk Surgery

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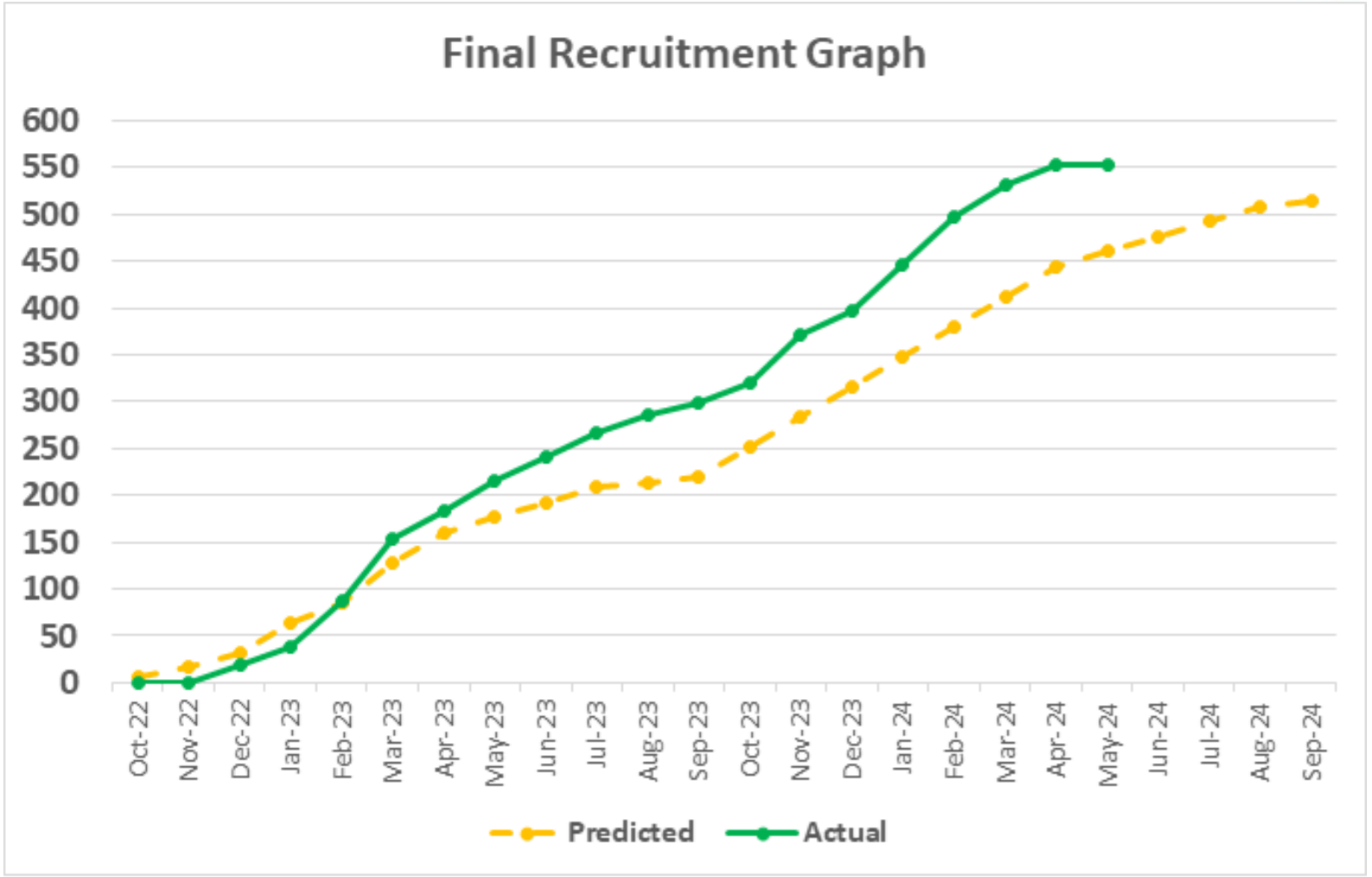
Patient recruitment



Recruitment completed April 2024, 5 months ahead of schedule!

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https://rapidtest.blogs.bristol.ac.uk/

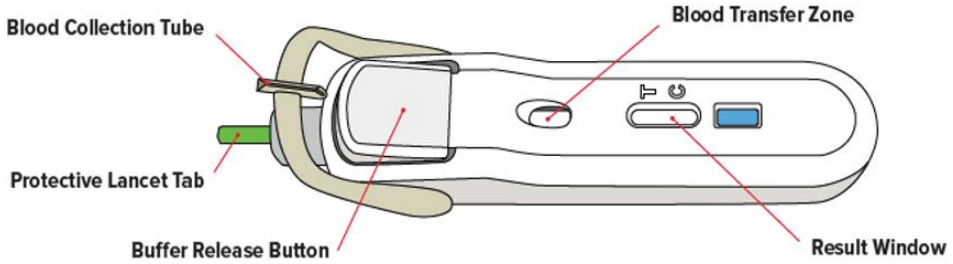
RAPID IMMUNE TEST

RAPID IMMUNE TEST

- Smaller, early-stage feasibility study
- 'Host response' POCT ($POCT^{HR}$)

FebriDx POCT

- Hand-held, single use, lateral flow assay
- Results in 10 minutes
- Measures CRP and MxA



RAPID IMMUNE TEST study

- Upper respiratory tract infections, children and adults
- Change in clinician diagnostic confidence, viral vs bacterial diagnosis and belief in the need for antibiotics
- Patient and clinician interviews
- Diagnostic accuracy assessment

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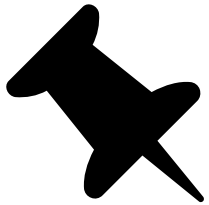
https://rapidimmunetest.blogs.bristol.ac.uk/

Looking forward

- POCTs for infection diagnostics in primary care is a rapidly evolving space
- POCT technology advances are exciting…
- However, high quality evidence is needed to understand whether POCTs do bring benefits e.g. accuracy, safety, cost effectiveness



Watch this space!

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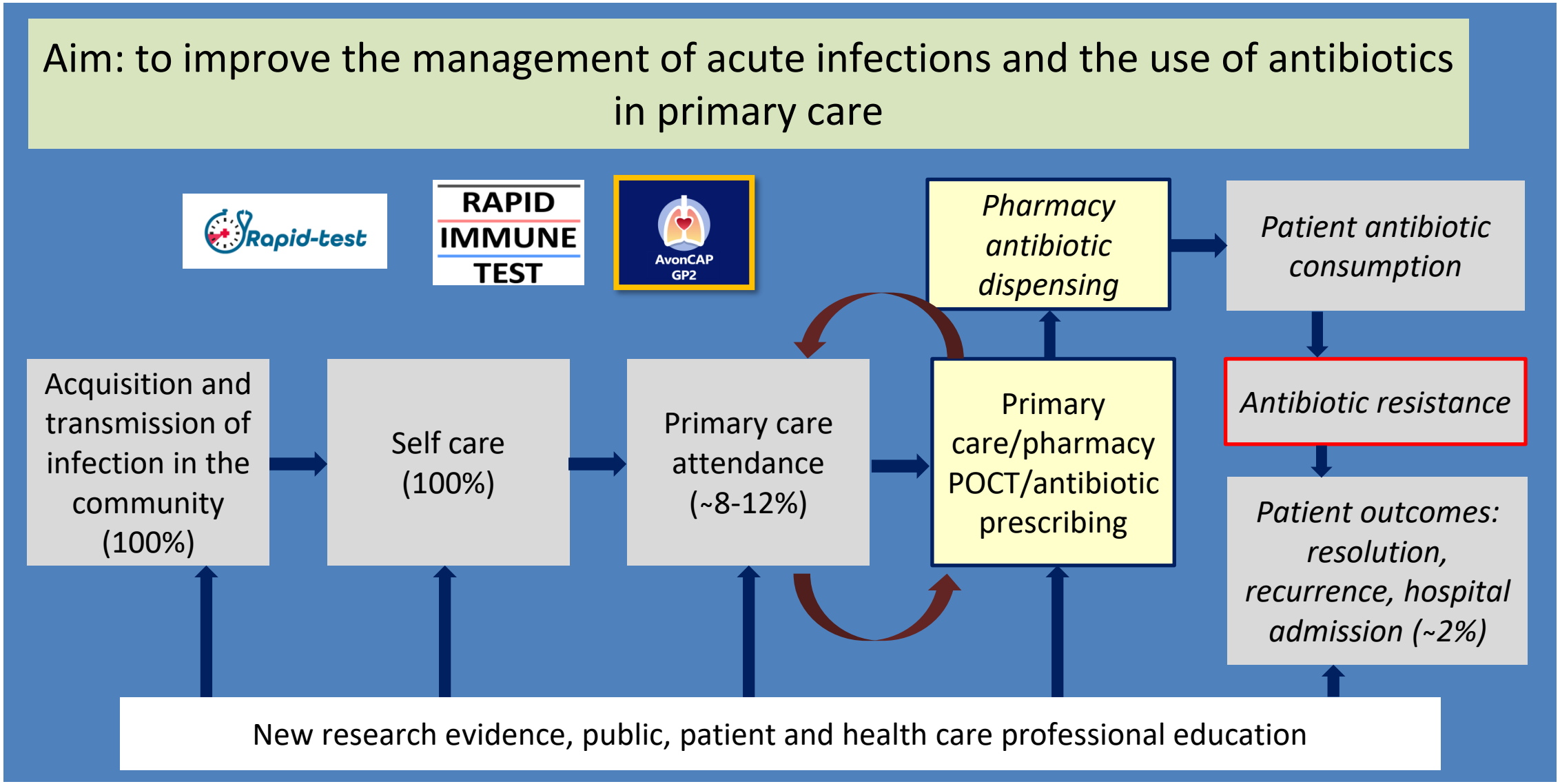

Delayed antibiotic prescribing

WHAT?

- How often is it used?
- What type of healthcare professionals use it most?
- For which patients and infections?
- Does it work?

WHERE?

- 6 GP practices in Bristol
- Approximately 120,000 registered patients

Patient electronic GP record

NHS Digital Electronic Prescription Service

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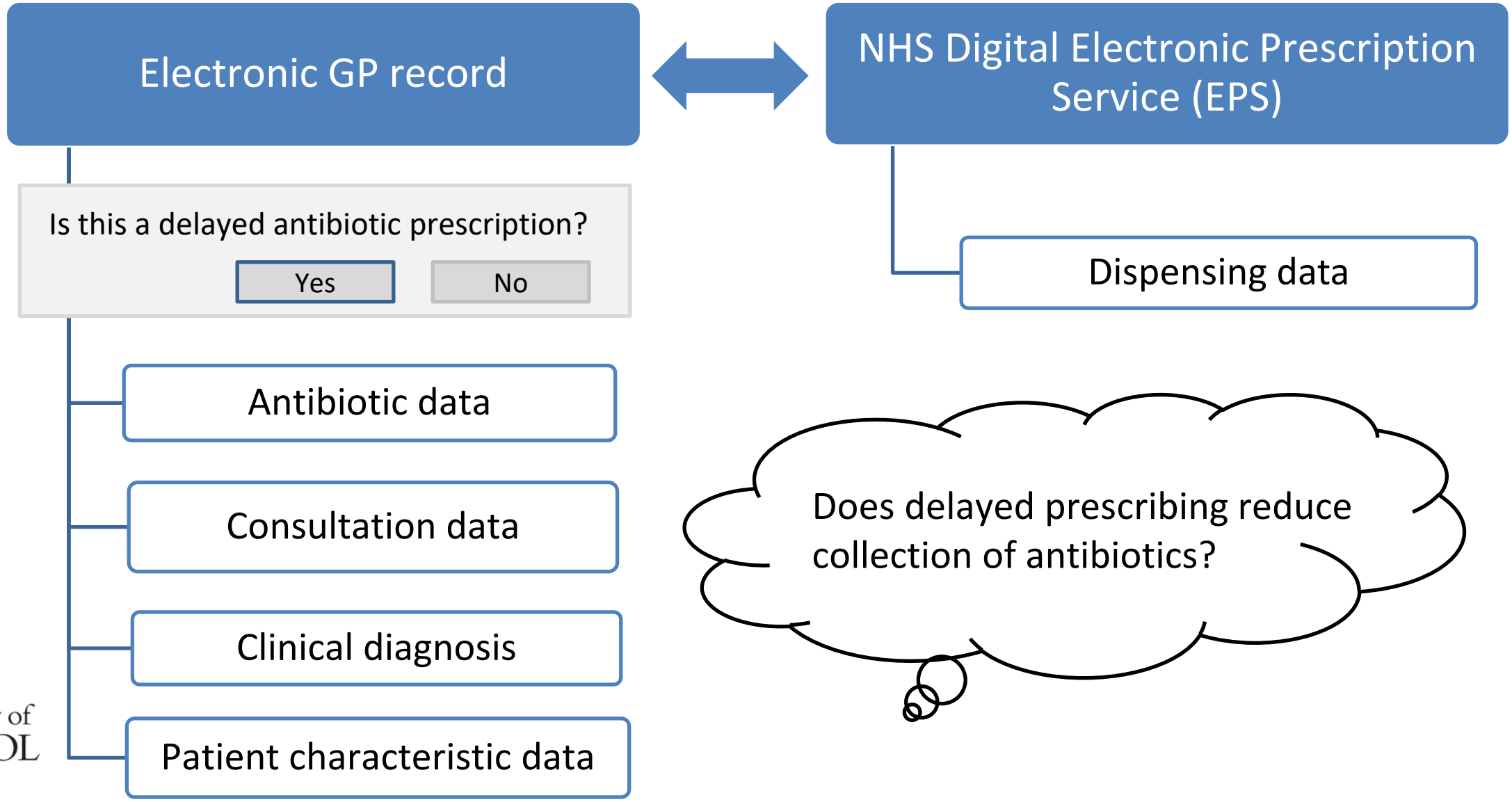
Delayed antibiotic prescribing



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Shameless plug…

- “Why take part in research?” film
- 2-minutes long
- Diverse range of people
- Positive feedback from patients
- Available in 11 languages
- Please use it!

Scan QR or click on link to access “Why take part in research?”

@capcbristol

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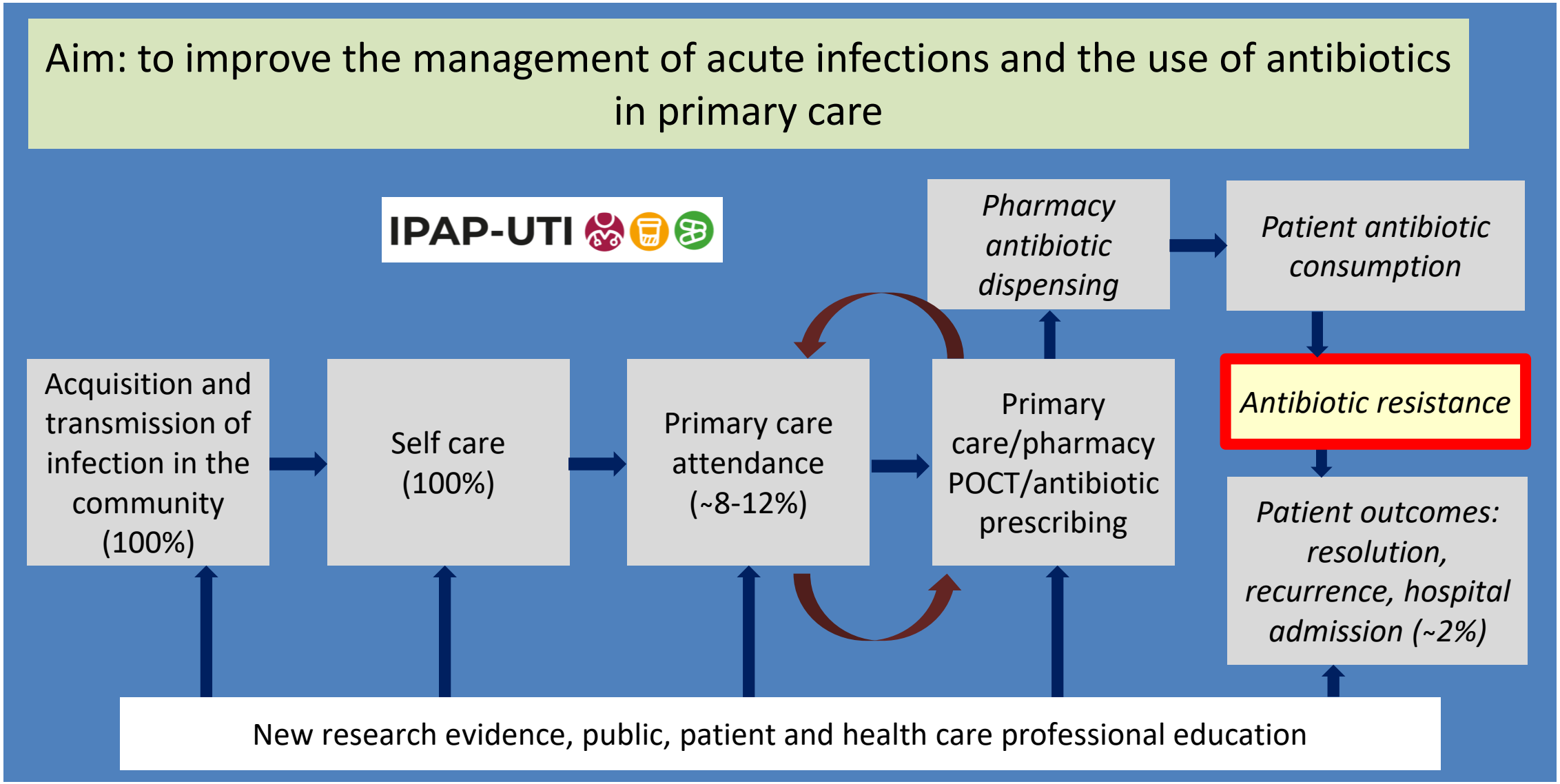

RESEARCH

OPEN ACCESS

Global prevalence of antibiotic resistance in paediatric urinary tract infections caused by *Escherichia coli* and association with routine use of antibiotics in primary care: systematic review and meta-analysis

Ashley Bryce,[1] Alastair D Hay,[1] Isabel F Lane,[1] Hannah V Thornton,[1] Mandy Wootton,[2] Céire Costelloe[3]

Antibiotics **2014**, *3*, 29-38; doi:10.3390/antibiotics3010029

OPEN ACCESS

antibiotics

Article

Antibiotic Prescribing in Primary Care a
Resistance in Patients Admitted to Hospit
Tract Infection: A Controlled Observatio

Ceire Costelloe [1,*], O. Martin Williams [2], Alan A. Montgomery [3],

RESEARCH

Effect of antibiotic prescribing in primary care on antimicrobial resistance in individual patients: systematic review and meta-analysis

Céire Costelloe, research associate,[1] Chris Metcalfe, senior lecturer in medical statistics,[2] Andrew Lovering, consultant clinical scientist,[3] David Mant, professor of general practice,[4] Alastair D Hay, consultant senior lecturer in primary health care[1]

PLOS ONE

RESEARCH ARTICLE

Antimicrobial resistance associations with national primary care antibiotic stewardship policy: Primary care-based, multilevel analytic study

Ashley Hammond[1]*, Bobby Stuijfzand[2], Matthew B. Avison[3], Alastair D. Hay[1]

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IPAP-UTI

IMPROVING PRIMARY CARE ANTIBIOTIC PRESCRIBING TO REDUCE ANTIBIOTIC RESISTANT URINARY TRACT INFECTIONS

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BRISTOL TRIALS CENTRE

FUNDED BY
NIHR | National Institute for Health and Care Research

UK Health Security Agency

Urinary tract infections

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WHAT

- A series of three randomised controlled trials (RCTs)
- One RCT per Integrated Care Board (ICB) in England
- GP practices in the ICB will be randomised to receive the intervention or not

WHY

- To determine which interventions to reduce AMR in UTIs have an effect
- Promote antimicrobial stewardship in primary care based on local AMR surveillance data
- Improved outcomes for patients with UTIs

WHERE

- ICBs in England, where the AMR ‘need’ is greatest, according to routinely collected AMR surveillance data from the UK Health Security Agency

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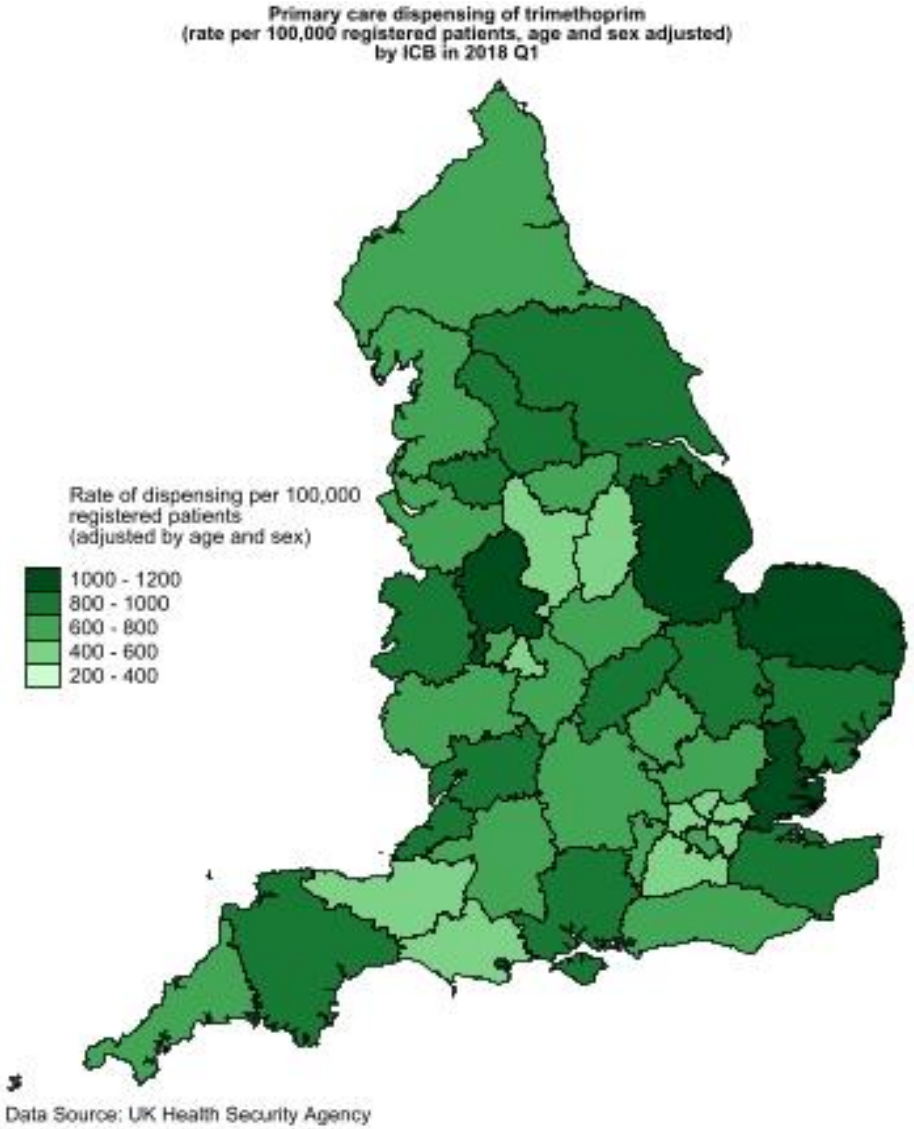
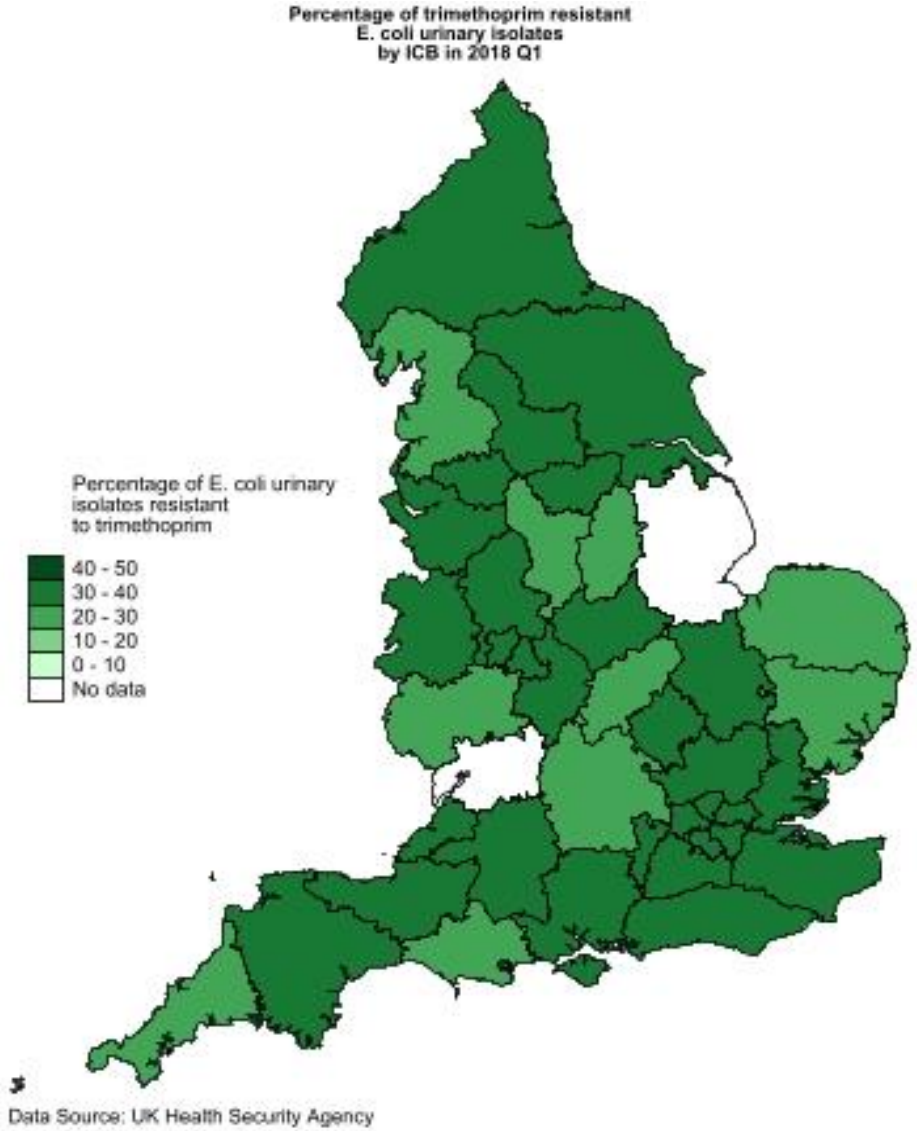
Antibiotic dispensing and resistance





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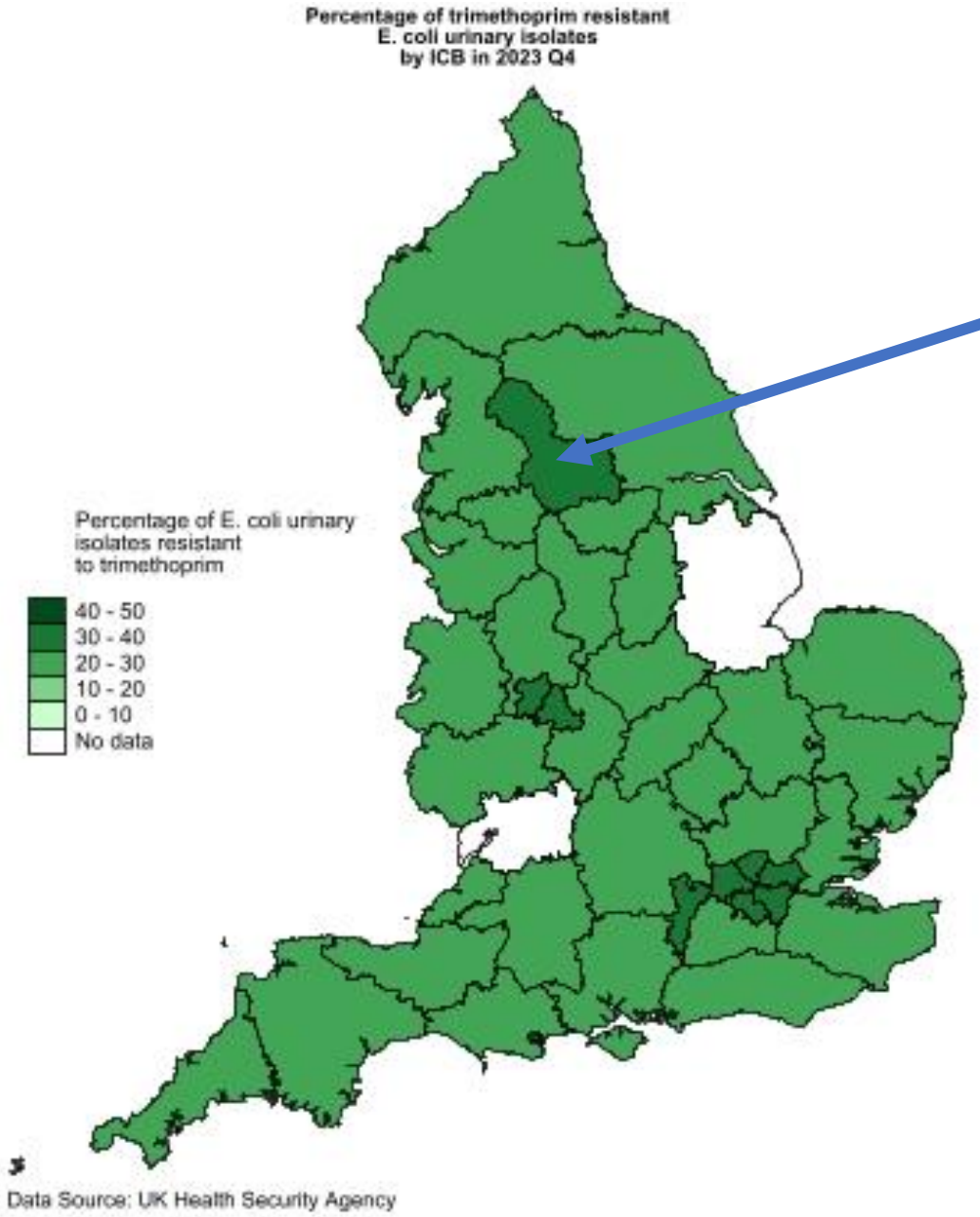

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Summary

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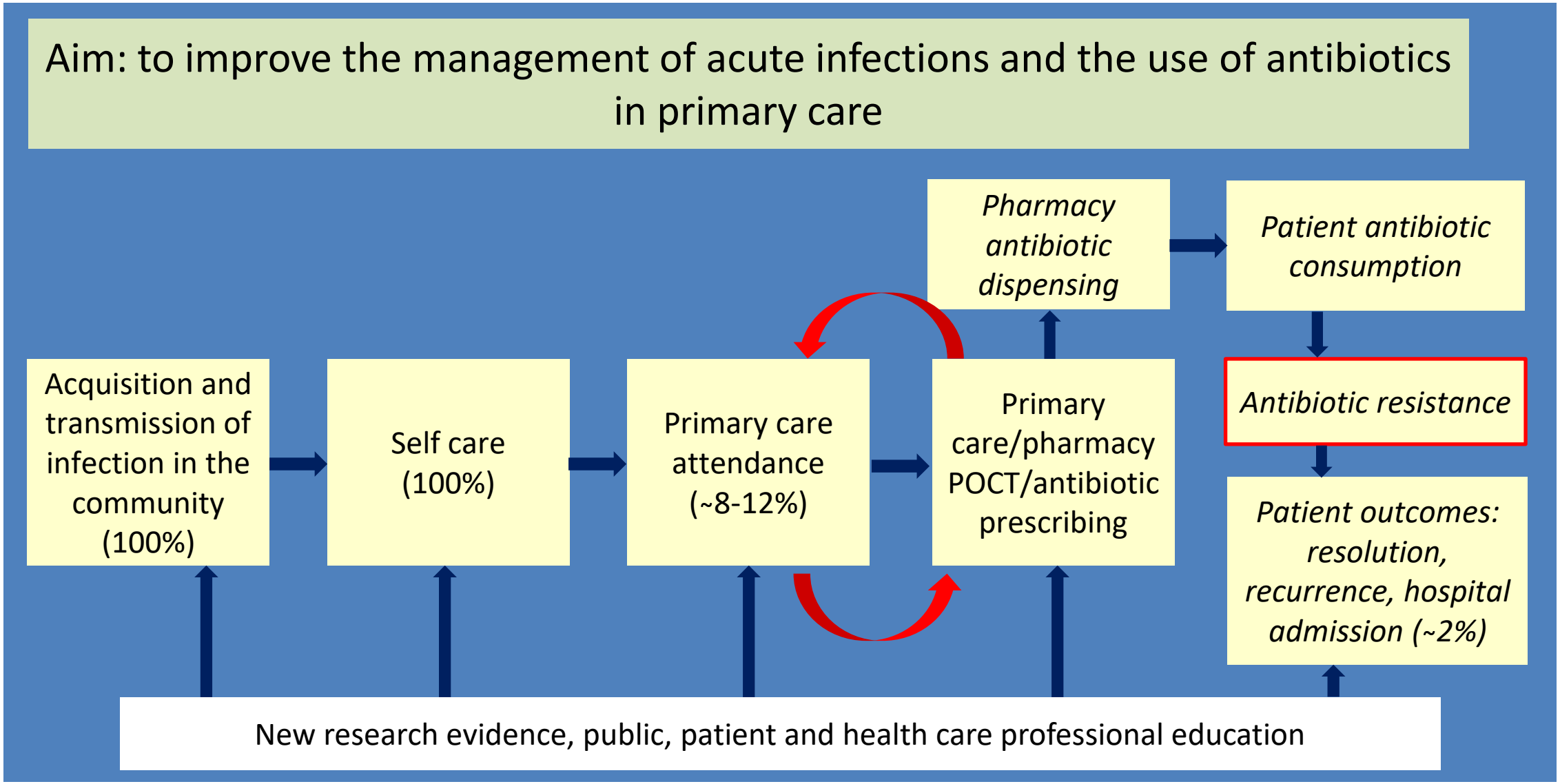

ANTIBIOTICS – USE ONLY IN EMERGENCY!

Thank you for listening

my actions protect antibiotics

ANTIBIOTIC GUARDIAN

UK SUPPORT FOR EUROPEAN ANTIBIOTIC AWARENESS DAY

join me at antibioticguardian.com

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