

# Professor Jacqui Reilly



The rise and spread of antibiotic resistant infections in healthcare and how they can be prevented

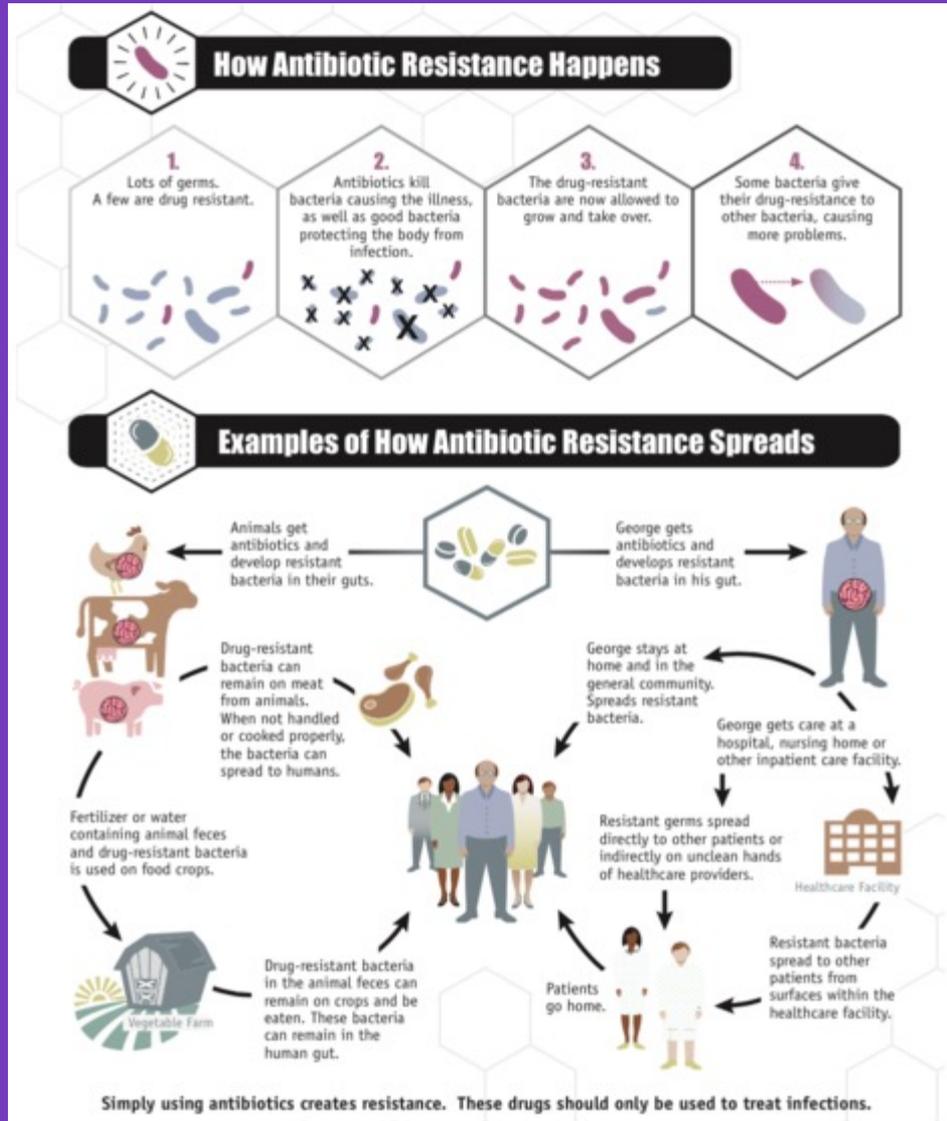
# Overview

- What are antibiotic resistant infections and why are they so dangerous?
- How can rise and spread be prevented?
- AMR in a healthcare setting and lessons learned from MRSA

# What are antibiotic resistant infections?



# What causes AMR?



# Top 7 AMR concerns worldwide

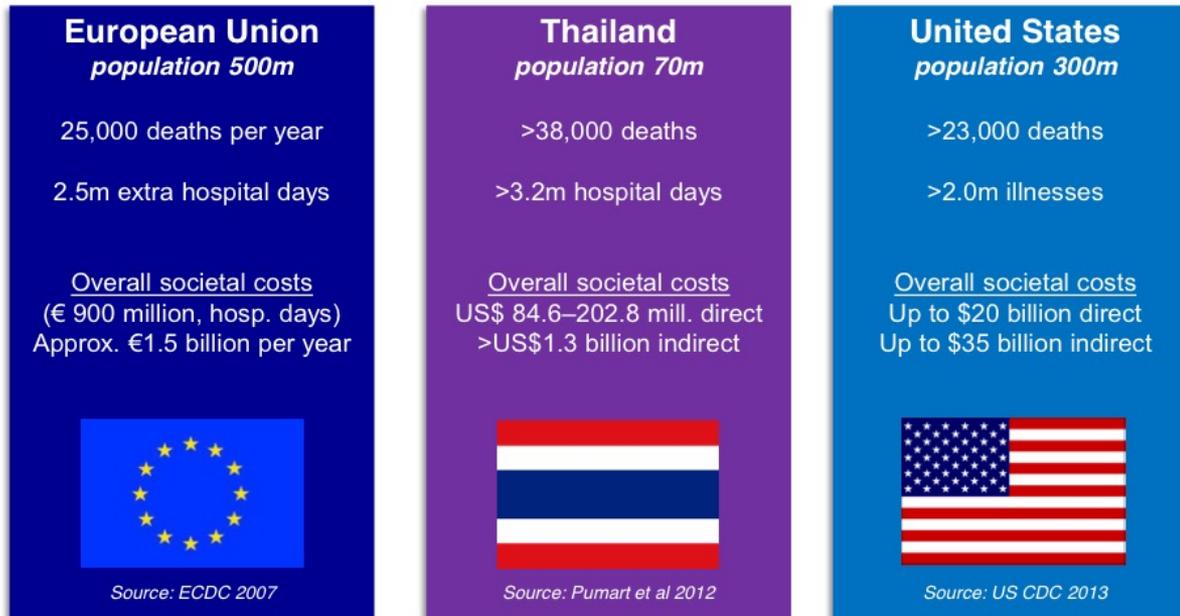
## Selected Bacteria/Resistance Combinations

Bacterium	Resistance/ decreased susceptibility to:
<i>Escherichia coli</i>	3 <sup>rd</sup> generation cephalosporins, fluoroquinolones
<i>Klebsiella pneumoniae</i>	3 <sup>rd</sup> generation cephalosporins, carbapenems
<i>Staphylococcus aureus</i>	Methicillin (beta-lactam antibiotics) i.e. MRSA
<i>Streptococcus pneumoniae</i>	Penicillin
Nontyphoidal <i>Salmonella</i> (NTS)	Fluoroquinolones
<i>Shigella</i> species	Fluoroquinolones
<i>Neisseria gonorrhoeae</i>	3 <sup>rd</sup> generation cephalosporins



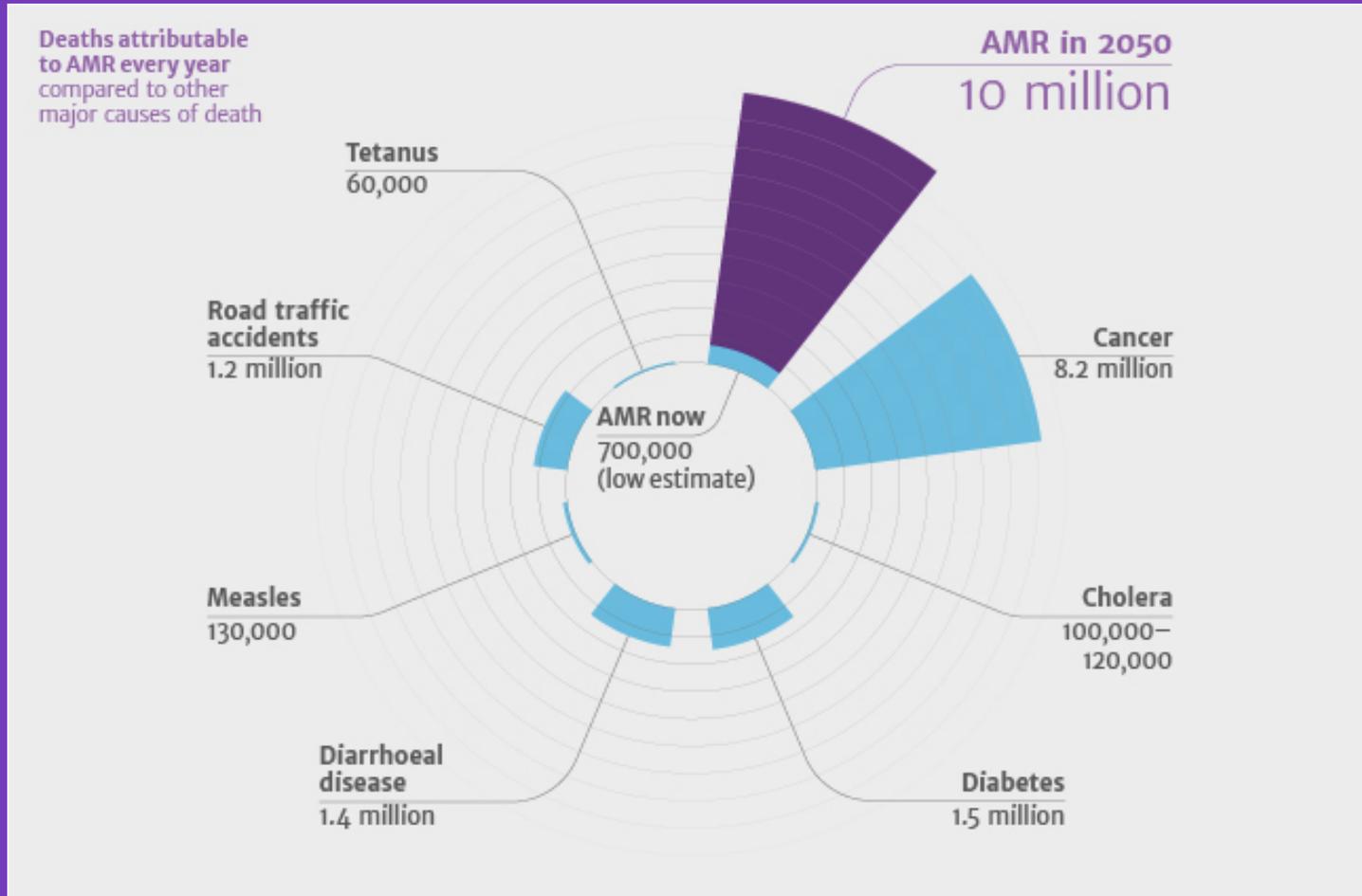
# Why are they so dangerous?

## Estimates of Burden of Antibacterial Resistance



Global information is insufficient to show complete disease burden impact and costs

# What might happen if we do not control AMR?



# How can rise and spread of superbugs be prevented?

1. Improving infection prevention and control practices in human and animal health
2. Optimising prescribing practice
3. Improving professional education, training and public engagement
4. Developing new drugs, treatments and diagnostics
5. Better access to and use of surveillance data in human and animal sectors
6. Better identification and prioritisation of AMR research needs
7. Strengthened international collaboration

# The case for HH

- Hand hygiene is argued to be the single most important intervention in preventing healthcare associated infection

ARTICLES

## Effectiveness of a hospital-wide programme to improve compliance with hand hygiene

Didier Pittet, Stéphane Hugonnet, Stephan Harbarth, Philippe Mourouga, Valérie Sauvan, Sylvie Touveneau, Thomas V Perneger, and members of the Infection Control Programme

### Summary

**Background** Hand hygiene prevents cross infection in hospitals, but compliance with recommended instructions is commonly poor. We attempted to promote hand hygiene by implementing a hospital-wide programme, with special emphasis on bedside, alcohol-based hand disinfection. We measured nosocomial infections in parallel.

**Methods** We monitored the overall compliance with hand hygiene during routine patient care in a teaching hospital in Geneva, Switzerland, before and during implementation of a hand-hygiene campaign. Seven hospital-wide observational surveys were done twice yearly from December, 1994, to December, 1997. Secondary outcome measures were nosocomial infection rates, attack rates of meticillin-resistant *Staphylococcus aureus* (MRSA), and consumption of handrub disinfectant.

**Findings** We observed more than 20 000 opportunities for hand hygiene. Compliance improved progressively from 48% in 1994, to 66% in 1997 ( $p < 0.001$ ). Although recourse to handwashing with soap and water remained stable, frequency of hand disinfection substantially increased during the study period ( $p < 0.001$ ). This result was unchanged after adjustment for known risk factors of poor adherence. Hand hygiene improved significantly among nurses and nursing assistants, but remained poor among doctors. During the same period,

### Introduction

Hand hygiene, either by handwashing or hand disinfection, remains the single most important measure to prevent nosocomial infections.<sup>1</sup> The importance of this simple procedure is not sufficiently recognised by health-care workers (HCWs),<sup>2</sup> and poor compliance has been documented repeatedly.<sup>3-5</sup> Although some previous interventions to improve compliance have been successful, none has achieved lasting improvement.<sup>2,6,7</sup> This situation led to the creation of a Handwashing Liaison Group<sup>8</sup> in the UK in 1997, whose mission is "to modify the behaviour of HCWs to produce sustained improvement in compliance with agreed handwashing standards and so improve the quality of patient care".<sup>8</sup>

In our hospital, we documented disappointing levels of hand hygiene compliance and identified several risk factors for non-compliance.<sup>5</sup> The observed relation between increased workload and reduced compliance suggested that promotion of bedside hand disinfection, less time-consuming than handwashing, may improve compliance.<sup>5,9</sup> Hence, we implemented a hospital-wide campaign to promote hand hygiene and, in particular, the use of alcohol-based handrubs.<sup>7</sup> We hypothesised that our programme would not only increase compliance with hand hygiene, but also diminish meticillin-resistant *Staphylococcus aureus* (MRSA) transmission and nosocomial infection rates. We describe the programme and its effectiveness.

# NEWS SCOTLAND

4 August 2013 Last updated at 00:24



## Doctors who fail on hand-washing 'should be sanctioned'

**NHS doctors should face disciplinary procedures if they fail to meet hand-washing standards, according to the Scottish Conservatives.**

Health spokesman Jackson Carlaw said stronger action was needed, as NHS figures suggested one in 10 doctors did not meet hand hygiene standards.

An NHS hand hygiene audit in May showed overall compliance in Scotland was 96%, but only 90% among senior medics.

The Scottish government said there was no room for complacency.

Mr Carlaw, who is also the Scottish Conservatives' deputy leader, said: "We need to consider the possibility of disciplinary action against doctors and anyone else who continually fails to meet hand hygiene standards."



The chief medical officer has said hand-washing for 15 seconds at a time reduces infection risk

### Related Stories

**Hand washing plea to cut infections**

**Why are the British so bad at washing their**



'Compassion alone will not stop the care failings'

Jenni Middleton, Editor

SPEAK OUT SAFELY CAMPAIGN



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## Hand hygiene compliance: exploring variations in practice between hospitals

8 December, 2008

This observational study examined differences in hand hygiene practice between four acute hospitals

Authors

Sile A. Creedon, MSc, BNS, DipIT (teachers), DipHP, RNT, RGN, RM, CC, is lecturer, School of Nursing and Midwifery, University College Cork, Ireland; Barbara Slevin, MSc, HDip Infection Control, PG Perioperative Theatre Nursing, RGN, is infection control nurse; Valerie De Souza is research



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Should nurses take a pragmatic approach to hand hygiene?

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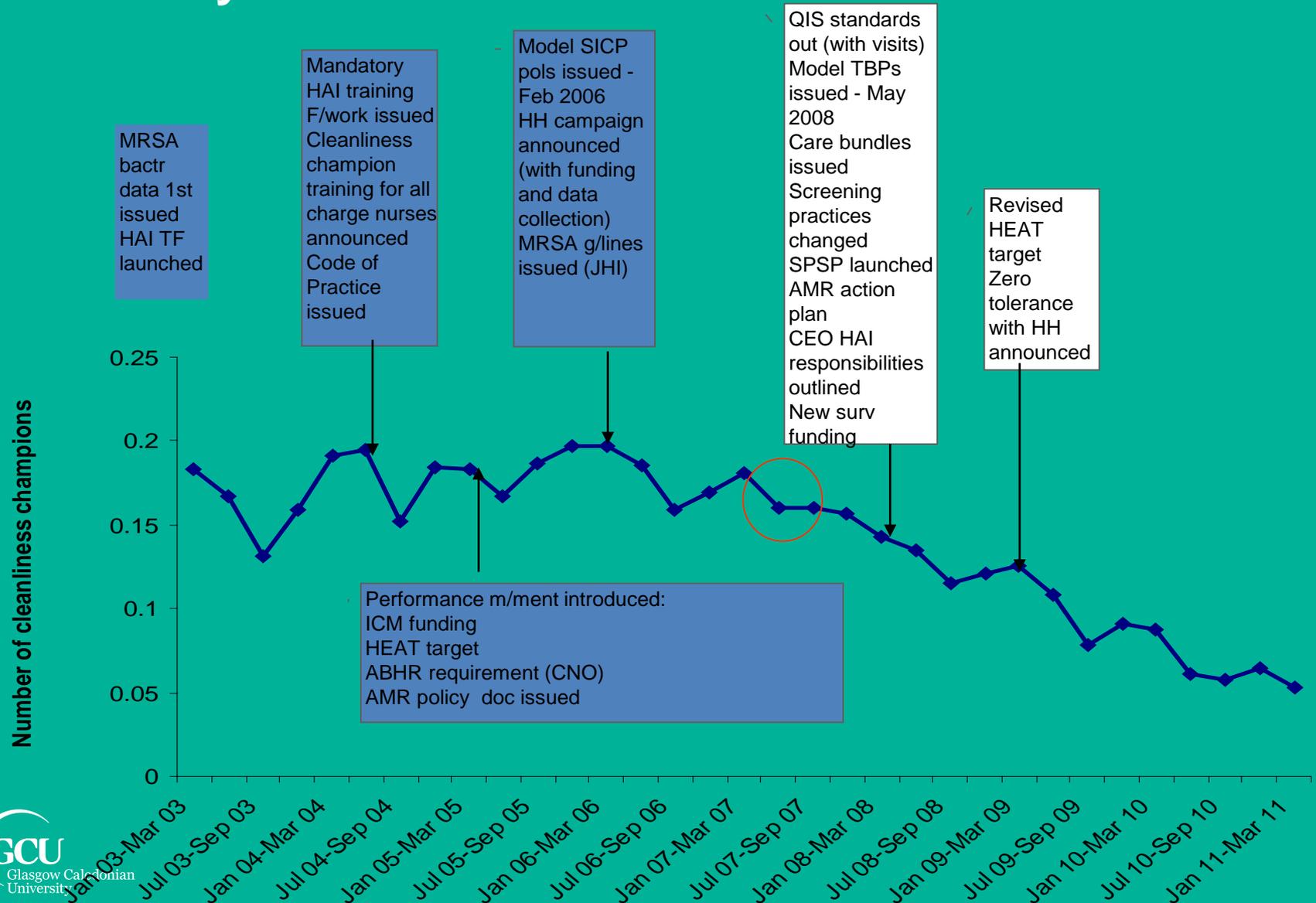
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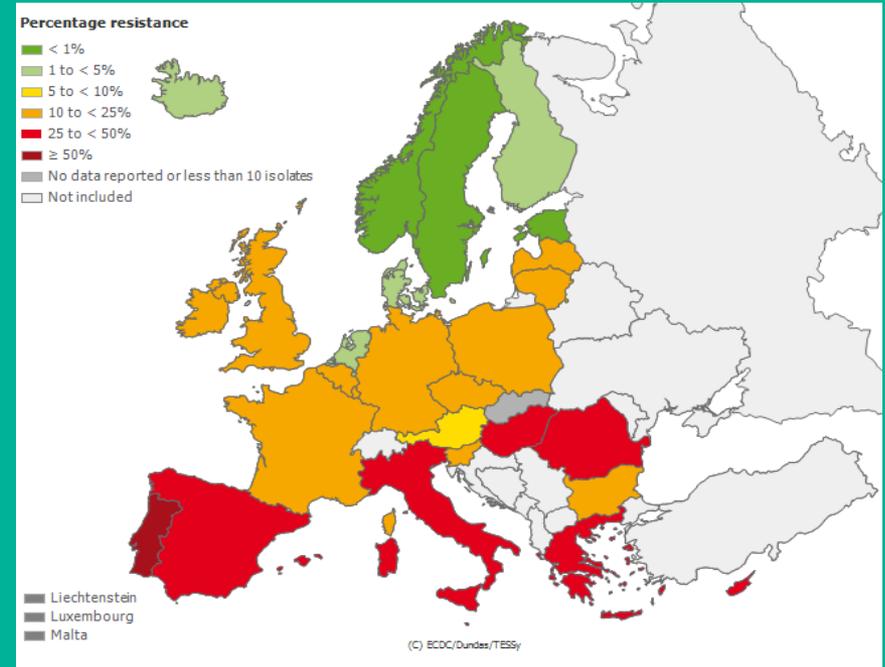
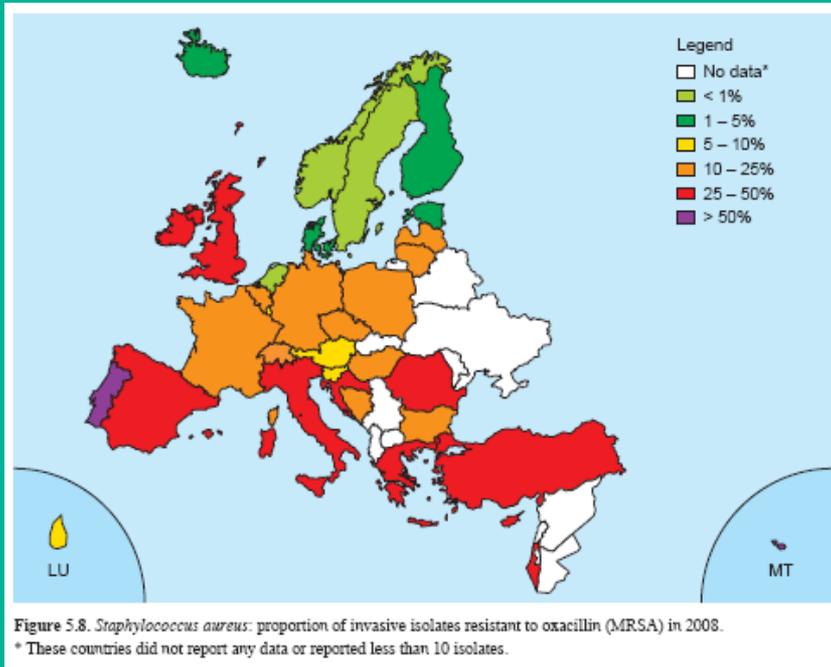
# So can we turn back the tide of AMR?



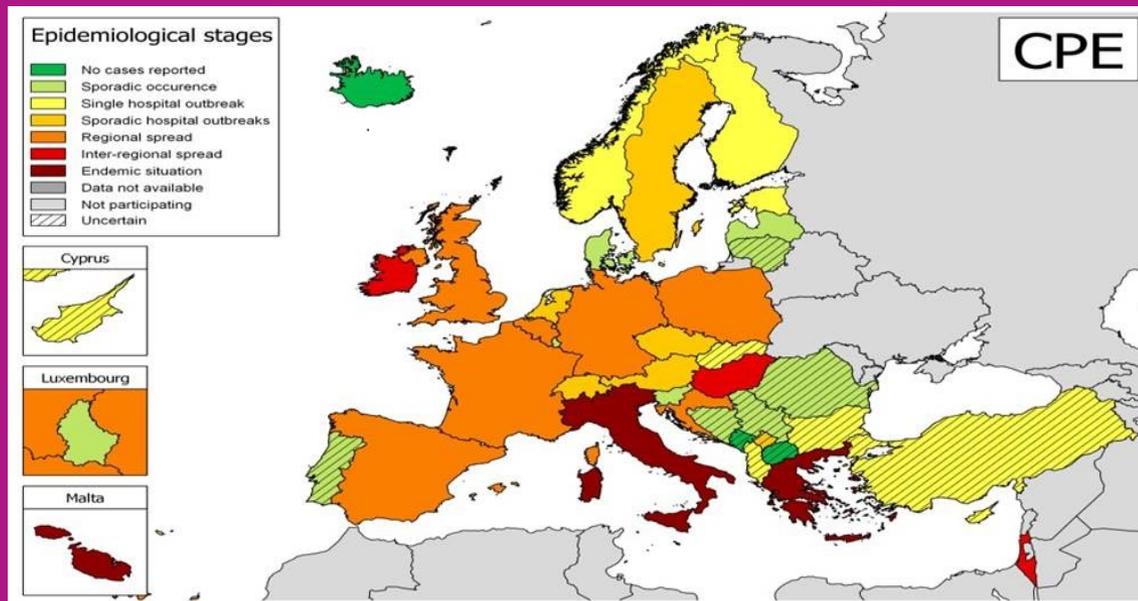
# The story of MRSA in Scotland



# Spot the difference!



# Emerging threats from superbugs: Carbapenem resistant (or Carbapenamase producing) Enterobacteriaceae



Light green: sporadic

Yellow: single outbreaks

Orange: sporadic outbreaks

Dark Orange: regional spread (UK)

Red: Inter-regional spread

Brown: Endemic

# Summary

- AMR is threatening public health
- There is an international call to action to prevent infection and contain AMR
- The single most important intervention to prevent infections is hand hygiene
  - If we prevent infections we use less antibiotics
- There are lessons to be learned from the MRSA story
- The emerging threats such as CPE need additional actions
- There is a need for more research to inform what these actions might be across the whole healthcare collective and food chain
- GCU research is addressing

Valerie Ness, Dr Lesley Price, Professor Kay Currie,  
Professor Jacqui Reilly

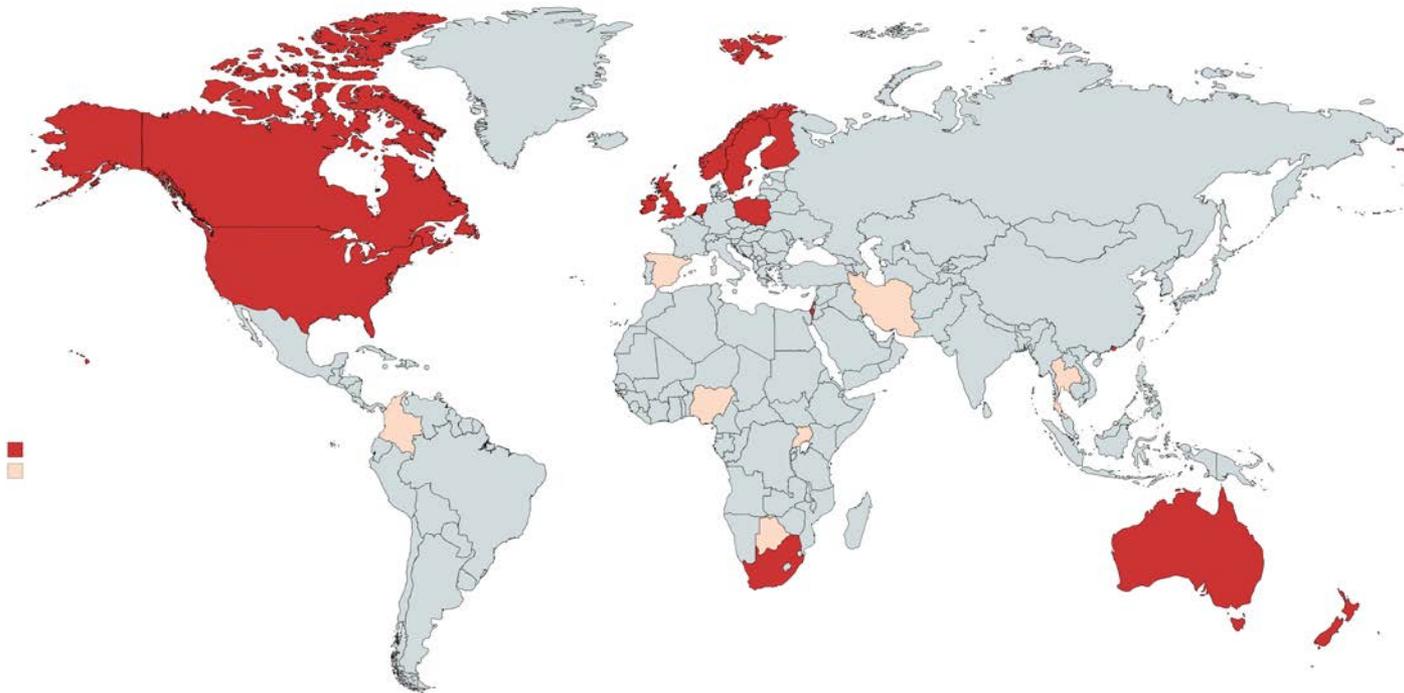


# A path to least resistance: a study of nurse antibiotic prescribing behaviour



# Setting the scene

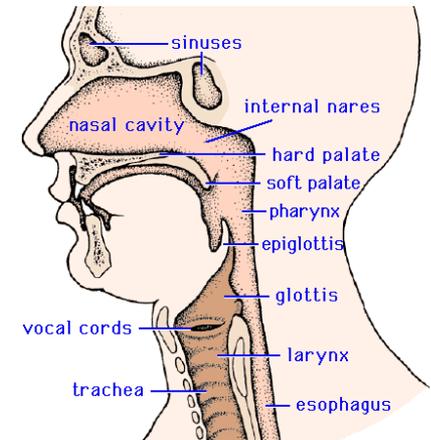
- Antimicrobial Resistance (AMR) is a major public health concern which is accelerated by high consumption, frequency & imprudent use of antimicrobials. Therefore appropriate prescribing is essential.
- Many nurses across the world, through additional training or specific guidance/governance, can independently prescribe and yet very little is known about their prescribing behaviour.



# The Study: Aim and Methods

- Aim:

To explore whether nurses intend to **manage patients, presenting with an Upper Respiratory Tract Infection (URTI) for the first time, without prescribing an antibiotic** and the influences on this behaviour.



- Methodology:

This was a three phase, mixed methods study, supported by a systematic review<sup>1</sup> & selection of a suitable theoretical framework.

<sup>1</sup>NESS, V., PRICE, L, CURRIE, K., REILLY, J. 2016, "Influences on antimicrobial prescribing in nurse prescribers: a systematic review", *Journal of Clinical Nursing*, vol.25, no.9-10, pp1206-1217, doi: 10.1111/jocn.13249

# Methodology



Systematic review & Retrospective analysis of primary care data



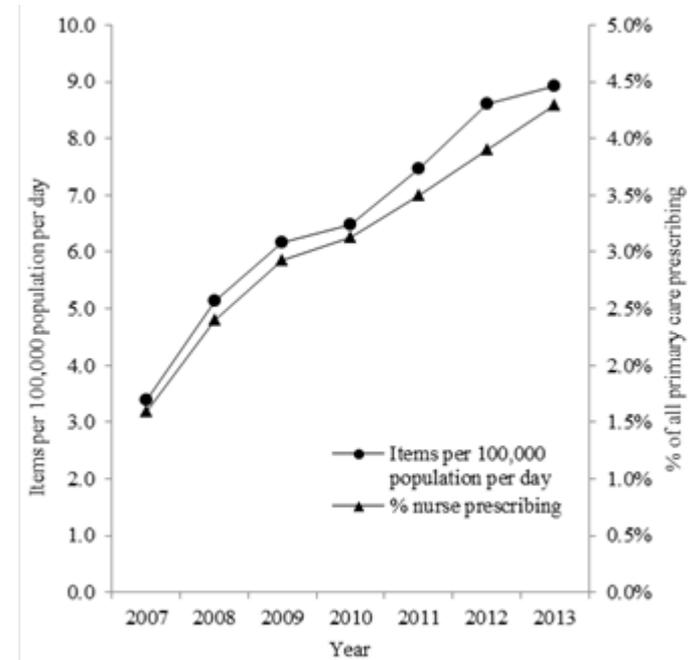
Telephone interviews with nurse prescribers across Scotland (n=27)



Development of questionnaire. National online survey (n=184)

# Key findings from the retrospective analysis<sup>1</sup>

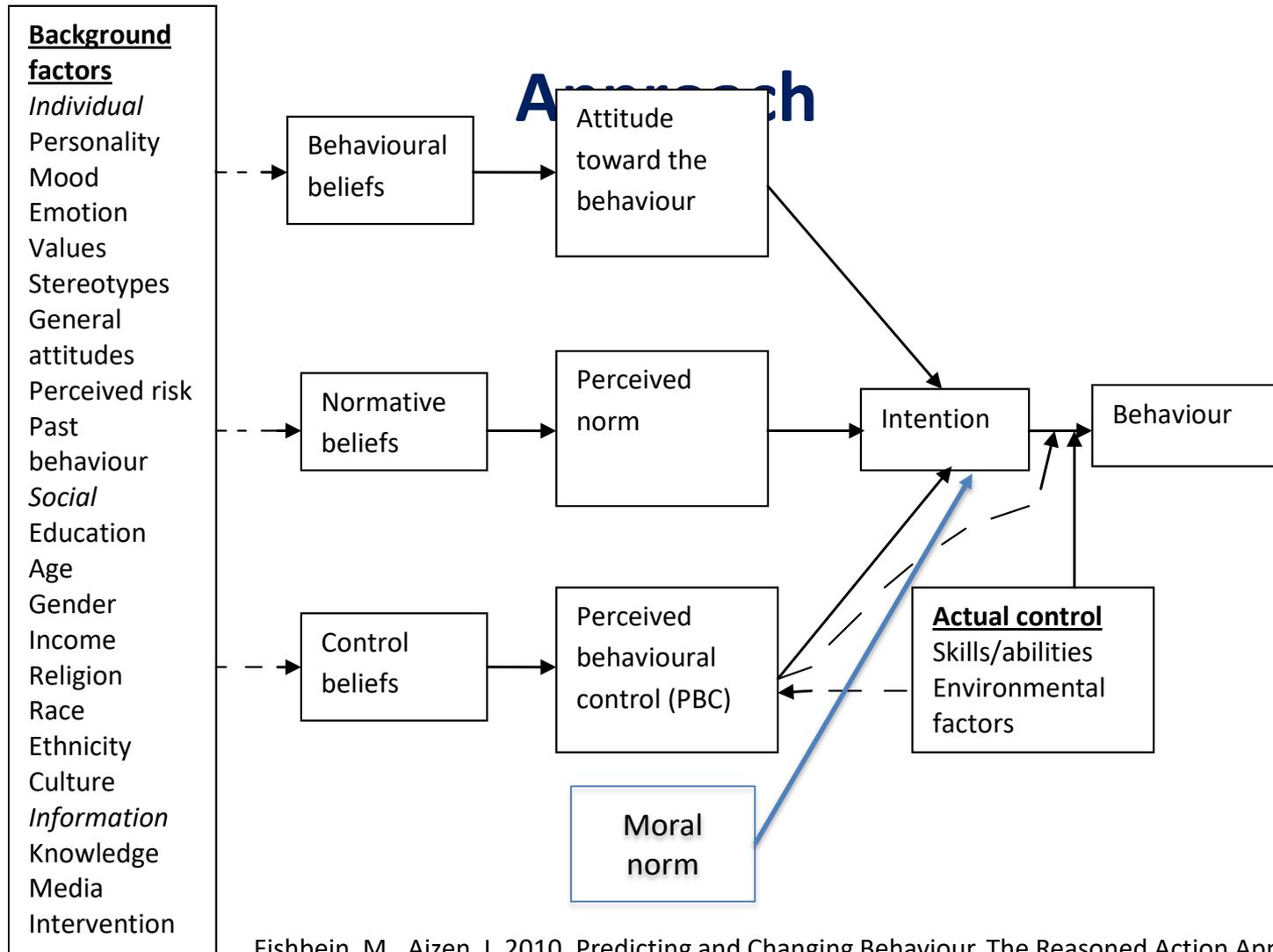
- Nurse prescribing of antibiotics is increasing (in total items and in the total % of overall antibiotic prescribing by all prescribers).
- The use of some quality indicators within the analysis (e.g. use of first line empirical treatments, reduction in use of broader spectrum agents, adherence to guidelines) suggest this cohort prescribe appropriately.



<sup>1</sup>NESS, V., MALCOLM, W., MCGIVERN, G., REILLY, J., 2015. Growth in nurse prescribing of antibiotics: the Scottish experience 2007-13. *Journal of Antimicrobial Chemotherapy* [online] **70**(12), pp.3384-3389. [viewed 18 February 2018]. Available from:

<https://doi.org/10.1093/jac/dkv255>

# Theoretical Framework: The Reasoned Action



Fishbein, M., Ajzen, I. 2010. Predicting and Changing Behaviour. The Reasoned Action Approach. Taylor & Francis Group, Croydon.

# Key findings from the interviews

The RAA framework was used to determine the salient beliefs. A content analysis of the interview data revealed the most frequently mentioned behavioural, normative and control beliefs:

Behavioural beliefs	Normative beliefs	Control beliefs
<u>Advantage</u> to managing patients without prescribing an antibiotic: <b>Reducing AMR</b> n=21 (78%)	<u>Most likely</u> to manage patients without prescribing an antibiotic: <b>Nurse prescribers</b> n=11 (41%)	<u>Barrier</u> to managing patients without prescribing an antibiotic: <b>Patient pressure</b> n=21 (78%)
<u>Disadvantage</u> to managing patients without prescribing an antibiotic: <b>Stress of patient expectation</b> n=11 (41%)	<u>Least likely</u> to manage patients without prescribing an antibiotic: <b>General practitioners</b> n=16 (59%)	<u>Enabler</u> to managing patients without prescribing an antibiotic: <b>Having the time to manage patient expectations by providing advice</b> n=27 (100%)

# Key findings from the survey

- Nurse prescribers intend to manage patients, presenting with an URTI for the first time, without prescribing an antibiotic.
- Key determinants of this intention: social pressure, morality and control over their own behaviour.
- The four key beliefs influencing this behaviour (significant in the regression analysis):

Social influence (normative beliefs)		
From other nonmedical prescribers	$\beta=0.042$	$p=0.007$
From other nurse prescribers	$\beta=0.036$	$p=0.045$
Barriers and facilitators (control beliefs)		
Facilitator: Experience and confidence	$\beta=0.044$	$p=0.001$
Barrier: Pressure from patients/carers to prescribe an antibiotic	$\beta=0.026$	$p=0.031$

## Key findings from the survey illustrated by qualitative comments from the interviews

They intend to manage patients without prescribing an antibiotic if they believe that **other nurse prescribers** are behaving this way (and they want to be like them):

*“I think a big reason for that is the time constraints that general practitioners have. Nurses tend to have a bit more time within their consultations to talk things through with patients and to explain the rationale for not giving antibiotics.”*

They intend to manage patients without prescribing an antibiotic if they have the **experience and confidence**.

*“I have experience...so I am used to having courageous conversations with patients.”* and *“The guidance is there, it’s just confidence, to be honest that’s the number one thing. I think it’s just experience.”*

## Key findings from the survey illustrated by qualitative comments from the interviews (cont.)

The belief with the greatest number of people holding this belief was “**pressure to prescribe**”

- 121 participants (66%) said this was likely to occur when patients presented to them with an URTI (between 5 and 7 on the 1-7 Likert scale) and 59 participants (32%) said that this would make them less likely to manage patients **without** prescribing an antibiotic.



*“What makes it hard is if the patient has got a perception that they know that it’s an infection and say “I want this antibiotic straight away”. It makes it a bit harder to make them understand.”*

*“Sometimes succumb to pressure from patients, it’s not an easy task”*

# Implications for practice



Promotion of this behaviour in other nurse prescribers through interventions which focus on:

- **reducing the influence of patient pressure**
  - ✓ through guidance about strategies to manage patient expectation
  - ✓ protected time to deliver these strategies e.g. education, delayed prescribing, symptom management.



# Implications for practice (cont.)

- **using the positive influence of other nurse prescribers**
  - ✓ through peer pressure/support
  - ✓ role-modelling
  - ✓ influence education programmes & resources
  - ✓ embedded peer support
  
- **changing nurse prescribers' beliefs about their capability**
  - ✓ through interventions such as “mastery”, emotive experiences, stress reduction
  - ✓ learning from their peers and reinforcement
  - ✓ identifying nurse prescriber opinion leaders



# Strengths of the study

- In-depth look at the behaviour of nurse prescribers when faced with patients presenting with an URTI.
- A mixed method approach allowed an investigation into current prescribing practice, a qualitative exploration of the beliefs of nurse prescribers, along with a powered survey to enhance generalisability of findings.
- Guidance from the Reasoned Action Approach has allowed a tried-and-tested set of measurement procedures to be applied to a previously unexplored behaviour.

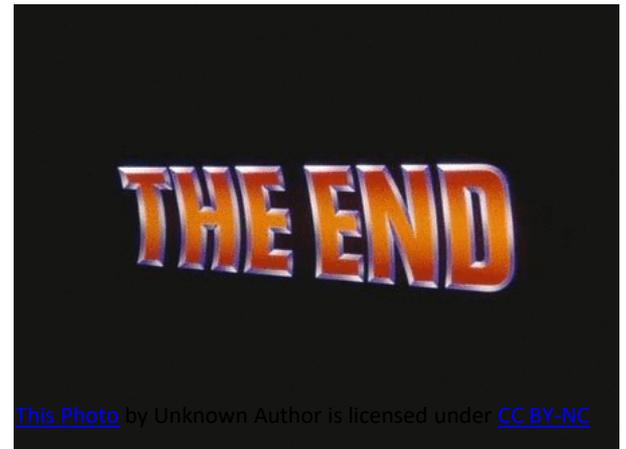


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# Final words

- New nursing standards in the United Kingdom, suggest that nurses should be ready to prescribe much earlier in their careers. This may have an impact on the role of the nurse in other countries.
- This is an important time to highlight the influence nurses can have on AMR through their antibiotic prescribing behaviour, and to focus on developing interventions to ensure as many as possible are prescribing appropriately.

**Thank you. Any questions?**



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# Antimicrobial Stewardship resources

Scottish Antimicrobial Prescribing Group: <https://www.sapg.scot/>  
Has links to useful education materials.

Antibiotic Guardian: <https://antibioticguardian.com/>

NHS Inform: Keep antibiotics working:  
<https://www.nhsinform.scot/campaigns/keep-antibiotics-working> Useful resources to use with patients.

NICE antibiotic prescribing guidelines:  
<https://www.nice.org.uk/about/what-we-do/our-programmes/nice-guidance/antimicrobial-prescribing-guidelines>

TARGET antibiotic toolkit: <https://www.rcgp.org.uk/clinical-and-research/resources/toolkits/target-antibiotic-toolkit.aspx>