Attenborough Surgery

Chest infection. Are you sure you need those antibiotics?

Using C Reactive Protein point of care testing in primary care.

Liz Cross, Nurse Practitioner, CLARHC fellow NIHR East of England

Attenborough Surgery

Bushey, Hertfordshire

Winner of NHS Innovation Challenge Prize (acorn category) 2015/16

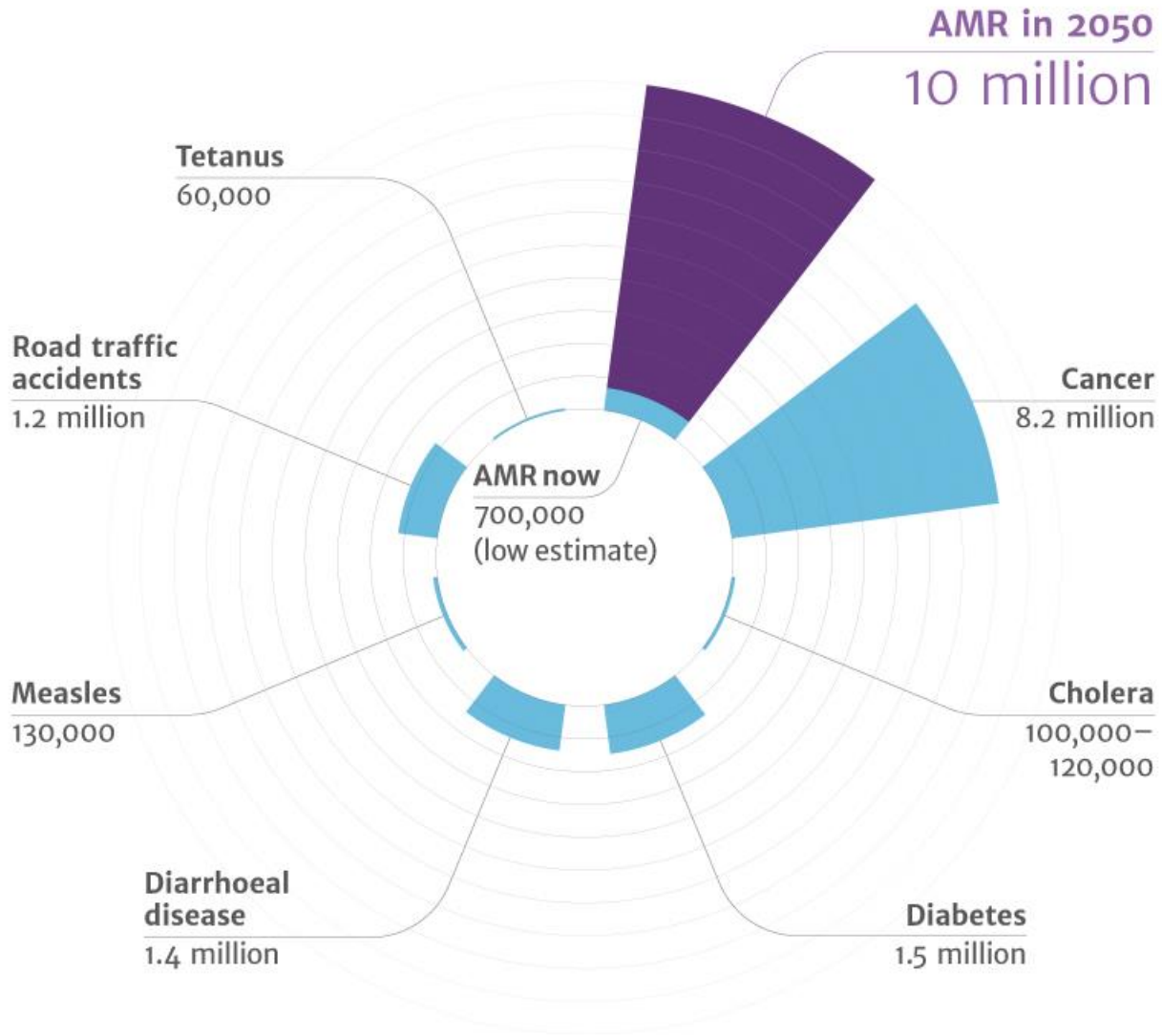
Winner Antibiotic Guardian Award 2017 Diagnostics

ANTIBIOTIC GUARDIAN AWARDS WINNERS

Make Your Pledge at Antibiotic Guardian.com

THE FUTURE IF WE DON'T ACT NOW

O'Neill Report 2015



BACK TO PRE-ANTIBIOTIC MEDICINE?

- “Antimicrobial resistance poses a catastrophic threat. If we don’t act now, any one of us could go to hospital in 20 years time for minor surgery and die because or an ordinary infection that can’t be treated with antibiotics. And routine operations like hip replacements or organ transplants could be deadly because of the risk of infection”

Chief Medical Officer-Dame Sally Davies

WHO IS PRESCRIBING?

Hospital inpatients

Hospital outpatients

Dental practices

Other community settings

https://www.gov.uk/government/publications/health-matters-antimicrobial-resistance/health-matters-antimicrobial-resistance

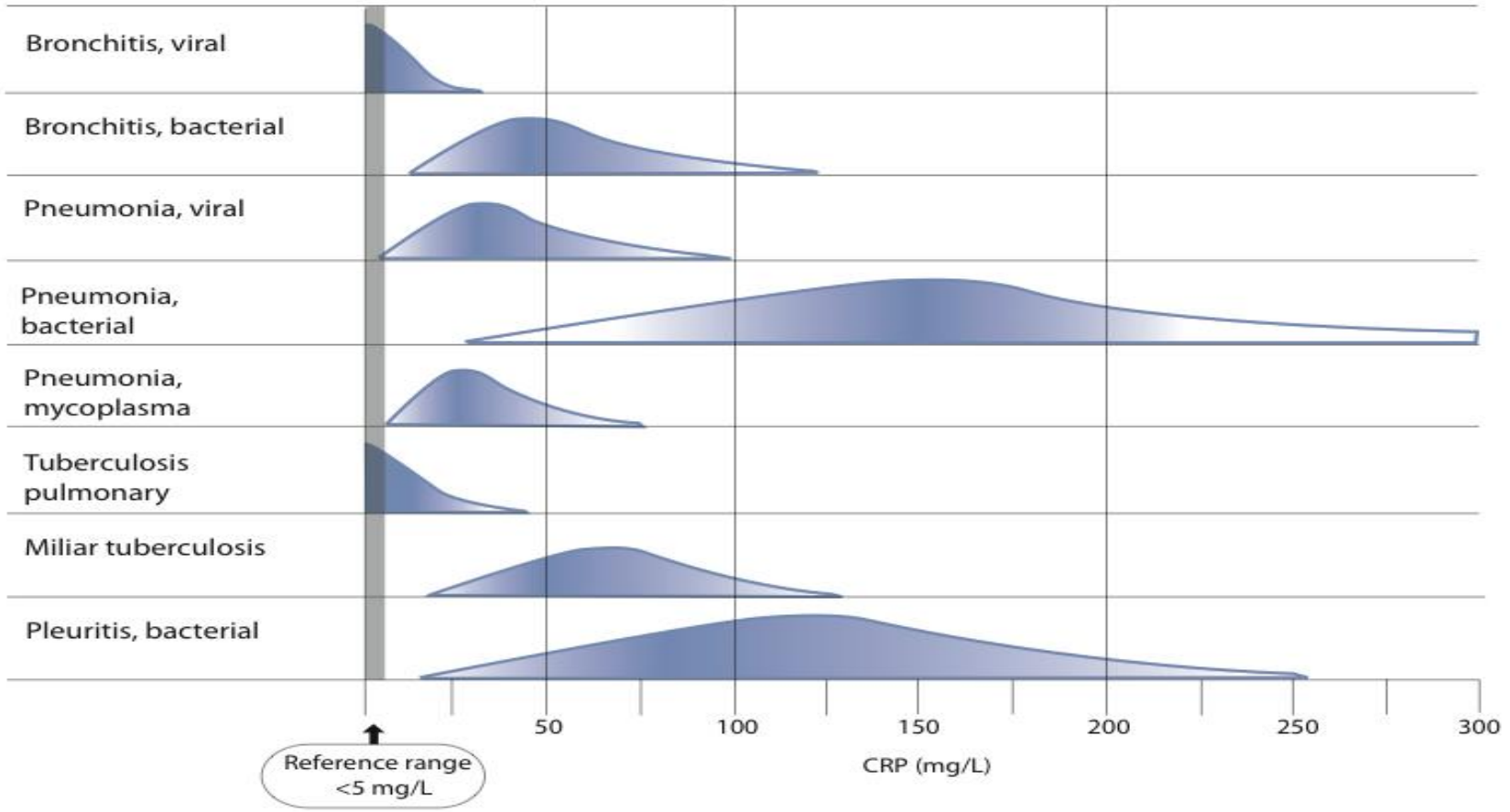
TACKLING ANTIMICROBIAL RESISTANCE ON TEN FRONTS

C-REACTIVE PROTEIN

- C-reactive protein (CRP) is a major acute-phase plasma protein displaying rapid and pronounced rise of its serum concentration in response to infection or tissue injury
- CRP levels are typically highest in patients with a bacterial infection
- A Simple CRP blood test (finger prick) takes just 4 mins
- Standard of care in many European countries

CRP LEVELS IN LOWER RESPIRATORY TRACT INFECTION

Typically higher values in bacterial infections than in viral infections



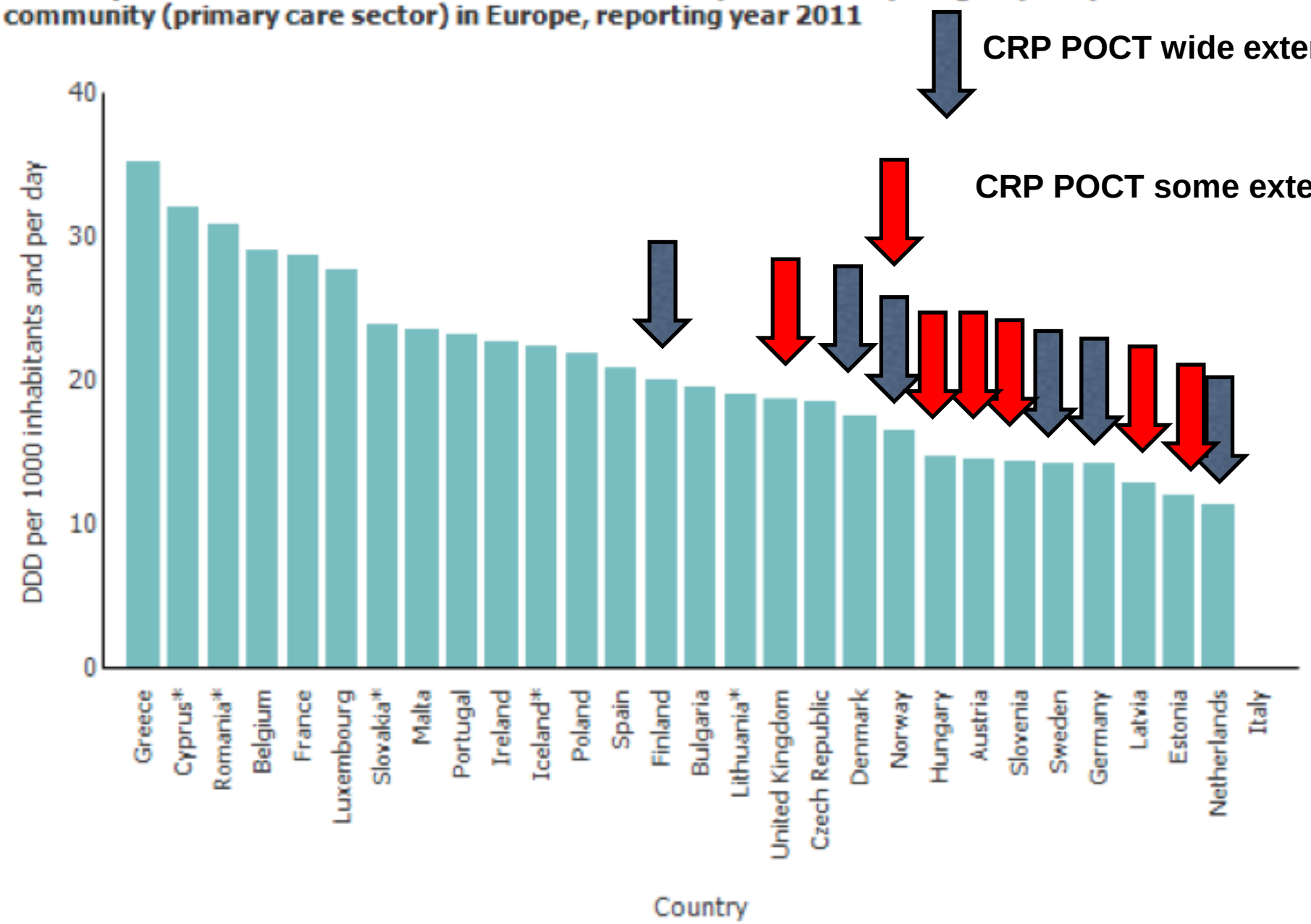
ANTIMICROBIAL STEWARDSHIP AND DIAGNOSTICS

- There is strong evidence that primary care CRP testing for RTI reduces antibiotic prescribing and enables patient education and the consultation discussion. Especially:

(i) where there is a high degree of diagnostic uncertainty

(ii) for patients who are very worried and/or demanding antibiotics

Consumption of antimicrobials of Antibacterials For Systemic Use (ATC group J01) in the community (primary care sector) in Europe, reporting year 2011



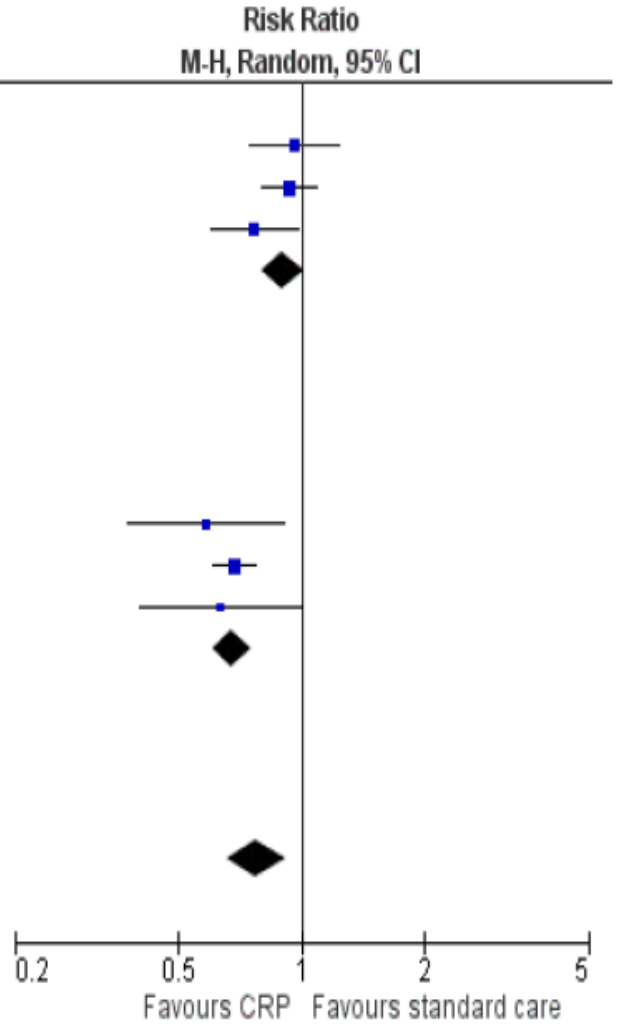
Biomarkers as point-of-care tests to guide prescription of antibiotics in patients with acute respiratory infections in primary care (Review)

Aabenhus R, Jensen JUS, Jørgensen KJ, Hróbjartsson A, Bjerrum L

THE COCHRANE COLLABORATION®

Figure 4. Forest plot of comparison: 1 C-reactive protein - antibiotic prescribing: all trials, outcome: 1.1 C-reactive protein - antibiotics prescribed at index consultation. All trials (cluster-RCTs modified sample size):.

Study or Subgroup	CRP Events	CRP Total	Standard care Events	Standard care Total	Weight	Risk Ratio M-H, Random, 95% CI	Year
1.1.1 Individually randomised trials							
Melbye 1995	54	108	68	131	17.1%	0.96 [0.75, 1.24]	1995
Diederichsen 2000	179	414	184	398	22.7%	0.94 [0.80, 1.09]	2000
Cals 2010	56	129	73	129	17.2%	0.77 [0.60, 0.98]	2010
Subtotal (95% CI)		**651**		**658**	**56.9%**	**0.90 [0.80, 1.02]**	
Total events	289		325				
Heterogeneity: Tau² = 0.00; Chi² = 2.11, df = 2 (P = 0.35); I² = 5%							
Test for overall effect: Z = 1.71 (P = 0.09)							
1.1.2 Cluster-randomised trials (modified sample size)							
Cals 2009	20	65	31	59	9.4%	0.59 [0.38, 0.91]	2009
Little 2013a	304	920	407	844	24.8%	0.69 [0.61, 0.77]	2013
Andreeva 2013	18	49	22	38	8.9%	0.63 [0.40, 1.00]	2013
Subtotal (95% CI)		**1034**		**941**	**43.1%**	**0.68 [0.61, 0.75]**	
Total events	342		460				
Heterogeneity: Tau² = 0.00; Chi² = 0.54, df = 2 (P = 0.76); I² = 0%							
Test for overall effect: Z = 7.08 (P < 0.00001)							
Total (95% CI)		**1685**		**1599**	**100.0%**	**0.78 [0.66, 0.92]**	
Total events	631		785				
Heterogeneity: Tau² = 0.02; Chi² = 15.41, df = 5 (P = 0.009); I² = 68%							
Test for overall effect: Z = 3.01 (P = 0.003)							
Test for subgroup differences: Chi² = 12.08, df = 1 (P = 0.0005), I² = 91.7%							



NICE 2014 – DECISION MAKING ALGORITHM

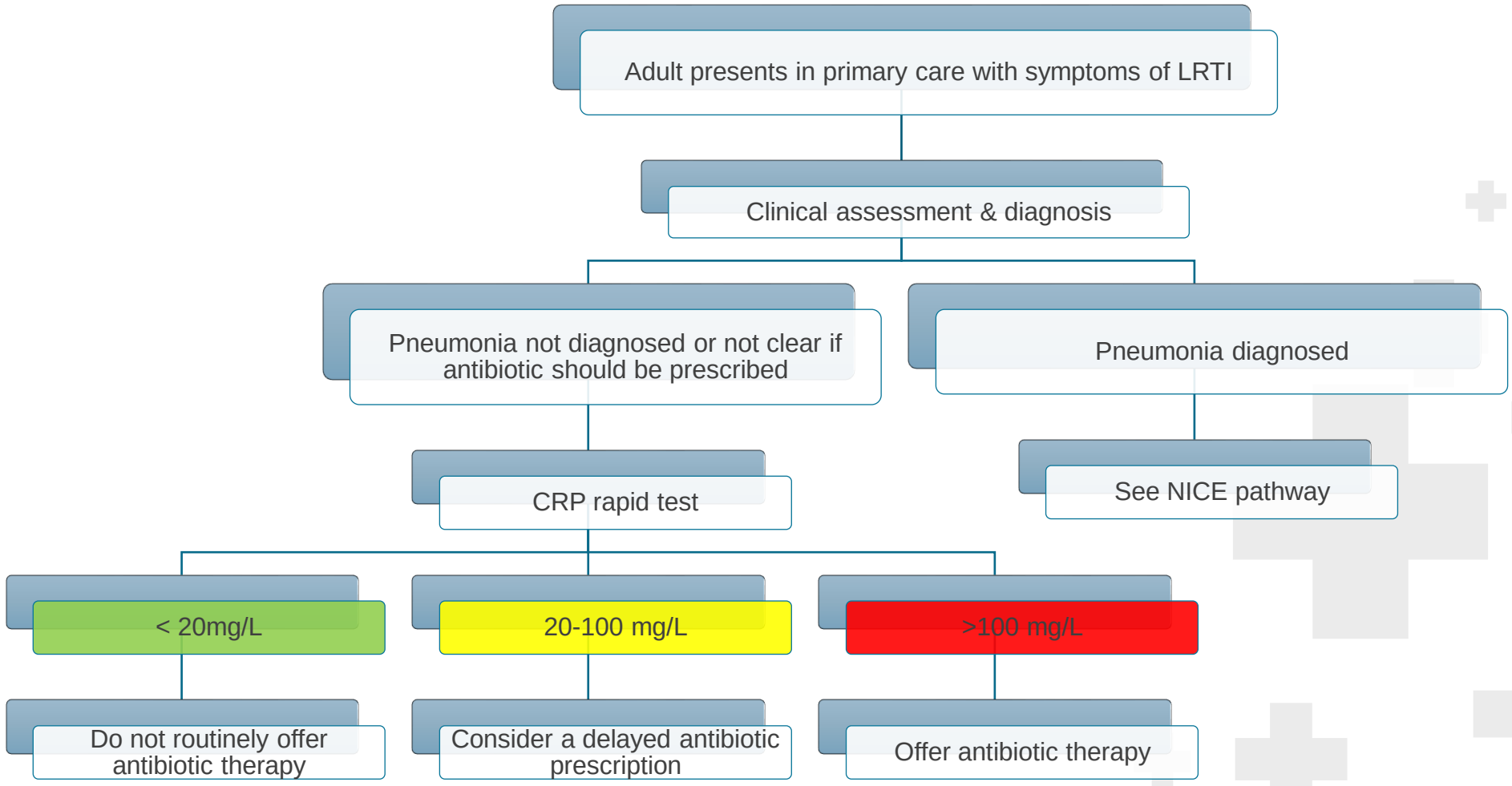
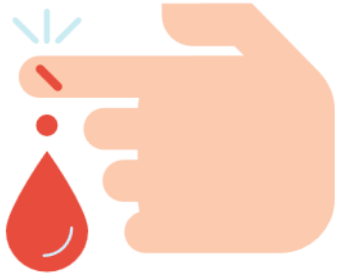


Figure 1. NICE recommendations for use of CRP point of care testing in patients presenting with a lower respiratory tract infection

PATIENT FLOW

Patient has chesty cough

Patient assessed at GP surgery



Patient has finger prick test

Results show if anti-biotics are needed and provide an opportunity for discussion with patient

COST EFFECTIVENESS

- ***Cals et al 2010*** - if society were willing to pay more than €121.7 for a 1% reduction in antibiotic prescribing, adding CRP to communication would be cost-effective

- ***Oppong et al 2013*** - POCCRP testing is also associated with a cost per quality-adjusted life year (QALY) gain of €9391. At a willingness-to-pay threshold of €30 000 per QALY gained, there is a 70% probability of CRP being cost-effective.

- ***Hunter 2015*** - Additional cost per patient of the CRP test is outweighed by the associated cost savings and QALY increment associated with a reduction in infections in the long term.

#AntibioticGuardian

The media and PHE have done a great job spreading awareness to the public and health professionals about the need to reduce antibiotic consumption

What we did this winter

8 GP practices (>10,000 list size and medium/high antibiotic prescribers)

- 5 sites using CRP point of care testing
- 3 sites using standard practice
- Nov 2016- Jan 2017

KPIs

Does CRP POCT reduce antibiotic prescriptions?

Does CRP POCT reduced unscheduled re-attendance within 28 days?

Is it cost effective?

NICE 2014 - Decision making algorithm

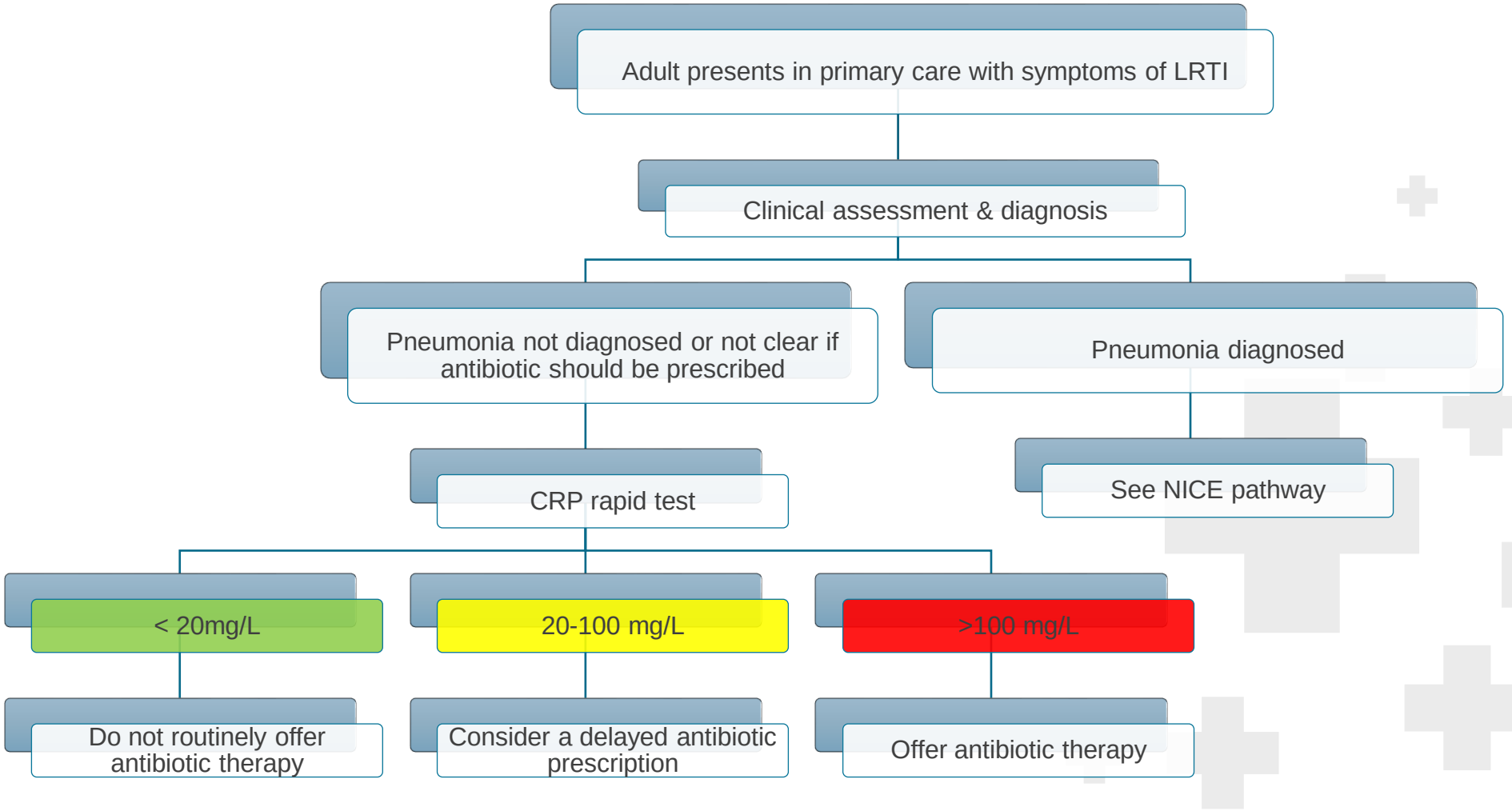


Figure 1. NICE recommendations for use of CRP point of care testing in patients presenting with a lower respiratory tract infection

Treating your infection

Patient Name _____

Your doctor or nurse recommends that you self-care ☐ **Back-up antibiotic prescription issued** ☐

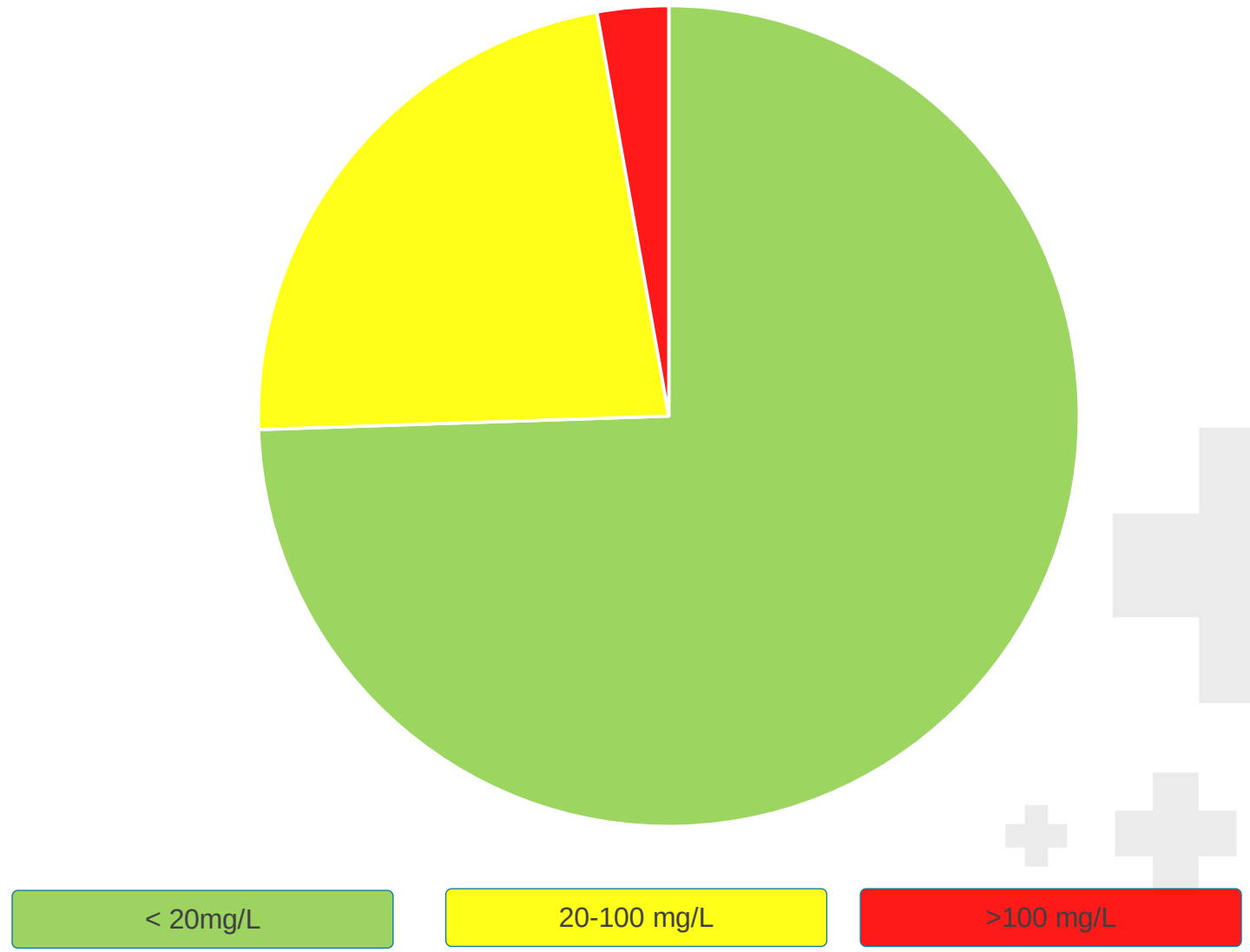
Your infection	Usually lasts	How to treat yourself better for these infections, now and next time	When should you get help: Contact your GP practice or contact NHS 111 (England), NHS 24 (Scotland dial 111), or NHS Direct (Wales dial 0845 4647)
☐ Middle-ear infection	4 days	• Have plenty of rest. • Drink enough fluids to avoid feeling thirsty. • Ask your local pharmacist to recommend medicines to help your symptoms or pain (or both). • Fever is a sign the body is fighting the infection and usually gets better by itself in most cases. You can use paracetamol (or ibuprofen) if you or your child are uncomfortable as a result of a fever. • Other things you can do suggested by GP or nurse:	**1. to 8. are possible signs of serious illness and should be assessed urgently.** **Phone for advice if you are not sure how urgent the symptoms are.** 1. If you develop a severe headache and are sick. 2. If your skin is very cold or has a strange colour, or you develop an unusual rash. 3. If you feel confused or have slurred speech or are very drowsy. 4. If you have difficulty breathing. Signs can include: ○ breathing quickly ○ turning blue around the lips and the skin below the mouth ○ skin between or above the ribs getting sucked or pulled in with every breath. 5. If you develop chest pain. 6. If you have difficulty swallowing or are drooling. 7. If you cough up blood. 8. If you are feeling a lot worse. **Less serious signs that can usually wait until the next available GP appointment:** 9. If you are not improving by the time given in the 'Usually lasts' column. 10. In children with middle-ear infection: if fluid is coming out of their ears or if they have new deafness. 11. Other .....
☐ Sore throat	7 days		
☐ Common cold	10 days		
☐ Sinusitis	18 days		
☐ Cough or bronchitis	21 days		
☐ Other infection:	..... days		

Back-up antibiotic prescription to be collected after ☐ days only if you do not feel better or you feel worse.

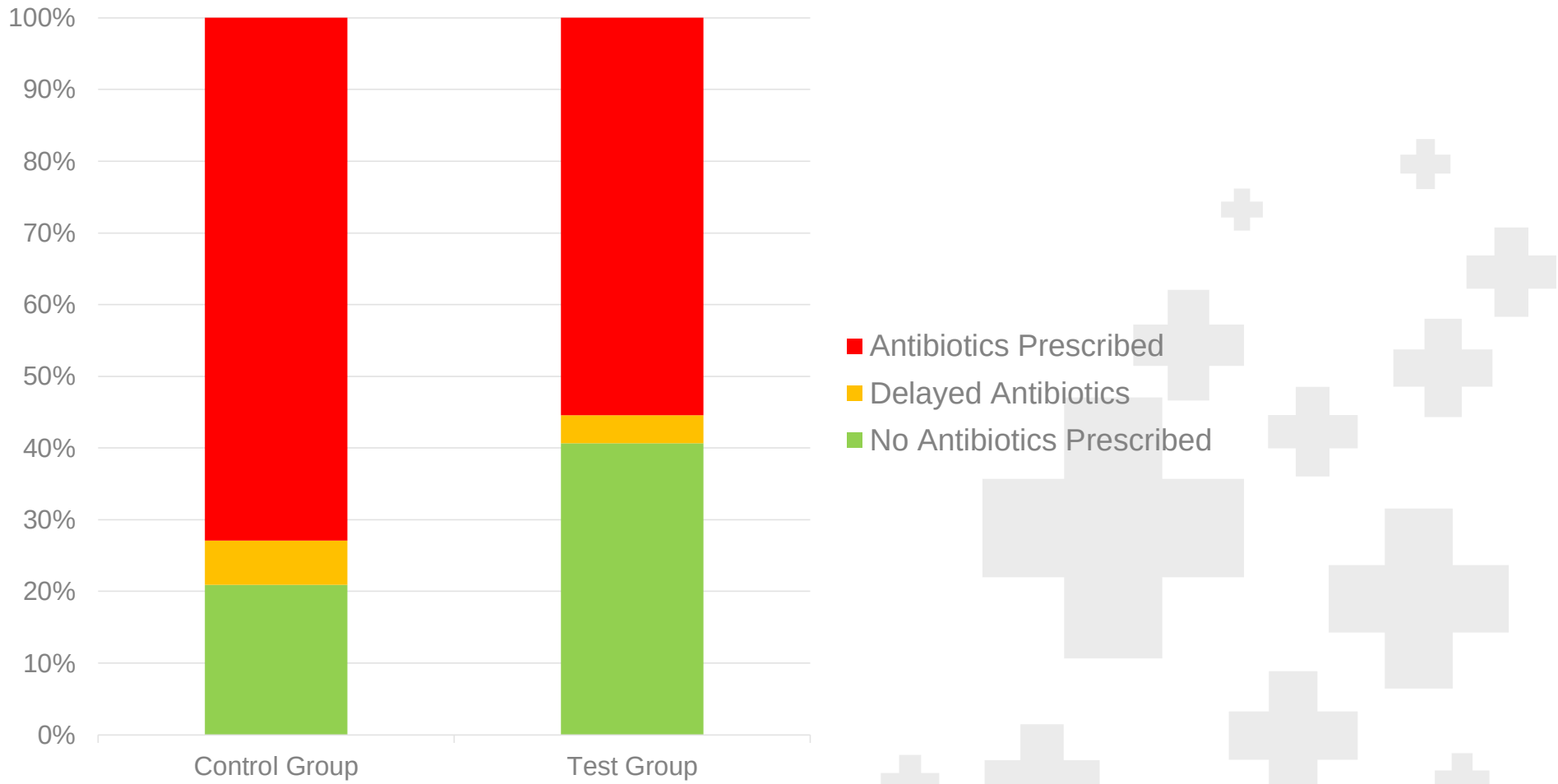
Collect from: ☐ GP reception ☐ GP or nurse ☐ Pharmacy

- Colds, most coughs, sinusitis, ear infections, sore throats, and other infections often get better without antibiotics, as your body can usually fight these infections on its own.
- The more we use antibiotics, the greater the chance that bacteria will become resistant to them so that they no longer work on our infections.
- Antibiotics can cause side effects such as rashes, thrush, stomach pains, diarrhoea, reactions to sunlight, other symptoms, or being sick if you drink alcohol with metronidazole.

CRP RESULTS BY PERCENTAGE

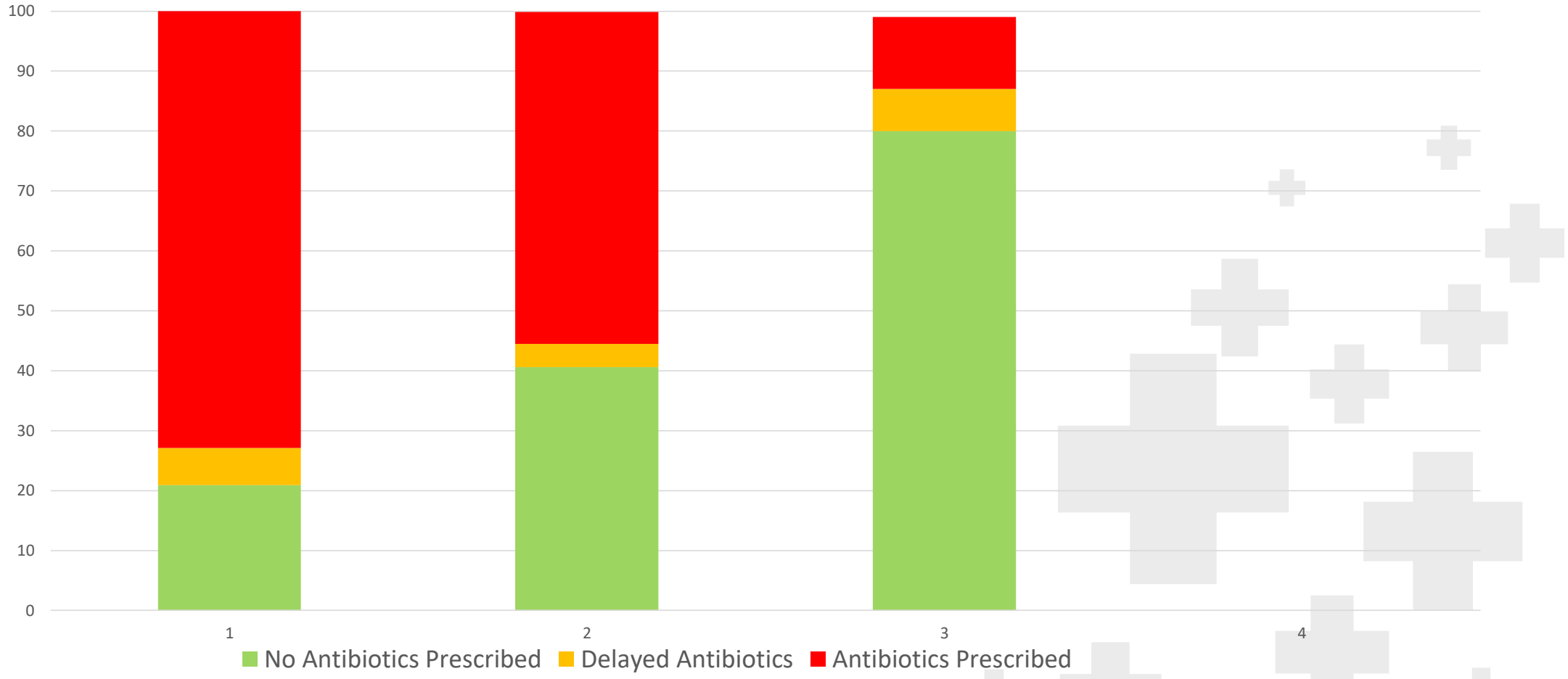


PRESCRIBING OUTCOME



CRP POCT has a statistically significant effect on antibiotic prescription, with the odds of prescription ~62% lower for those patients in the intervention compared to the control arm when adjusted for age

PRESCRIBING OUTCOME



CRP POCT has a statistically significant effect on antibiotic prescription, with the odds of prescription ~62% lower for those patients in the intervention compared to the control arm.

FOLLOW UP APPOINTMENTS

	Control Group	Test Group
If no antibiotics prescribed, what % were seen again in the NHS within 28 days?	**31.5%**	**23.1%**
If antibiotics were prescribed, what % were seen again in the NHS within 28	**43.1%**	**37.0%**

Odds ratios associated with follow up consultation after the initial presentation (irrespective of whether an antibiotic was prescribed). shows that CRP POCT has a statistically significant effect, with the odds of follow up ~32% lower for those patients in the intervention compared when adjusted for age.

Healthcare events and costs by group

		Control arm (n = 258)			Intervention arm (n = 682)		
Event type	Unit cost	With ≥ 1 event	Number of events	Total cost	With ≥ 1 event	Number of events	Total cost
CRP Test	£3.50	-	-	£-	176	176	£616.00
ABX at Outcome	£5.51	204	204	£1,124.04	405	405	£2,231.55
FUp	£36.00	99	99	£3,564.00	206	206	£7,416.00
ABX at FUp	£5.51	67	67	£369.17	140	140	£771.40
Later ABX	£5.51	11	38	£209.38	13	34	£187.34
Chest X-ray	£75.00	37	37	£2,775.00	63	63	£4,725.00
OOH	£75.00	13	13	£975.00	19	19	£1,425.00
Bloods	£6	3	3	£18.00	13	13	£78.00
GP	£36.00	26	93	£3,348.00	41	134	£4,824.00
ED	£91.00	2	2	£182.00	8	8	£728.00
Ambulance	£221	1	1	£221.00	1	1	£221.00
Total			557	£12,785.59		1,199	£23,223.29
Mean per patient			2.16	£49.55		1.76	£34.05

OVERALL COST BY STUDY ARM, GIVEN PROCUREMENT SCENARIOS

"The test gives us the confidence we need to sensibly restrict antimicrobial prescribing…[and] gives the patients confidence that they are getting the treatment they need"

CONCLUSION

- The availability of CRP testing equipment reduces the odds of an antibiotic prescription at initial presentation by 62% ($p<0.05$) after adjusting for age
- The odds of a follow up consultation was reduced by 32% ($p<0.05$) after adjusting for age
- The annual costs per patient is lower for the practice where CRP is available, even after overhead costs have been taken into account
- Overall, patients presenting to practice where CRP testing is available require fewer associated healthcare events

Key Messages:

- There are real cost savings to be made
- It is a practical solution to a real problem
- CRP POCT is ready to be scaled up across country

- Thank you for listening.

  Any questions?