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The impact on antibiotic use of routine molecular point-of-care testing for respiratory viruses in adults presenting to hospital with acute respiratory illness; results of a pragmatic randomised controlled trial (ResPOC)

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I have no conflicts of interest

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Point-of-care tests (POCTs) and acute respiratory illness in hospitalised adults

Respiratory viruses are detectable in 40 to 50% of hospitalised adults with acute respiratory illness[1,2]

Despite this, antibiotic use is near-universal[1]

1. Clark *et al.* 2014
2. Falsey *et al.* 2013

Tests for respiratory viruses

Respiratory virus testing via **laboratory PCR takes 1 – 2 days** to get a result and requires specialist personnel & facilities

Rapid antigen point-of-care tests:

- poor sensitivity, circa 50% in adults[1]
- generally limited in the range of viruses detected
- no clinical or health economic benefit in adults[2]

1. Chartrand *et al.* 2012
2. Nicholson *et al.* 2014

Molecular point-of-care tests (POCTs) for respiratory viruses

New molecular platforms:

- equivalent to lab PCR in sensitivity & specificity[1]
- can detect a wide range of viruses
- generate a result in about an hour
- some are deployable as POCTs
  - -e.g. *BioFire FilmArray Respiratory Panel*

- But no evidence for clinical benefit

Can the use of routine molecular point-of-care testing for respiratory viruses reduce unnecessary antibiotic use in adults hospitalised with acute respiratory illness?

1. Butt *et al.* 2014

ResPOC: methods

Pragmatic, parallel-group, open-label randomised controlled trial

Adults with acute respiratory illness and/or fever ≤ 7 days duration

Presenting to our large teaching hospital (ED & Acute Medicine)

Randomised 1:1 to nose & throat swab run on POCT for respiratory viruses with results communicated back to clinical team, or standard care

ResPOC: outcome measures

Primary outcome: proportion of patients given antibiotics

Key secondary outcomes:

Proportion of patients receiving only a single dose of antibiotics

Proportion of patients receiving less than 48 hours of antibiotics

Duration of antibiotics (in days)

Pre-specified analysis by clinical subgroup for above outcomes

Safety

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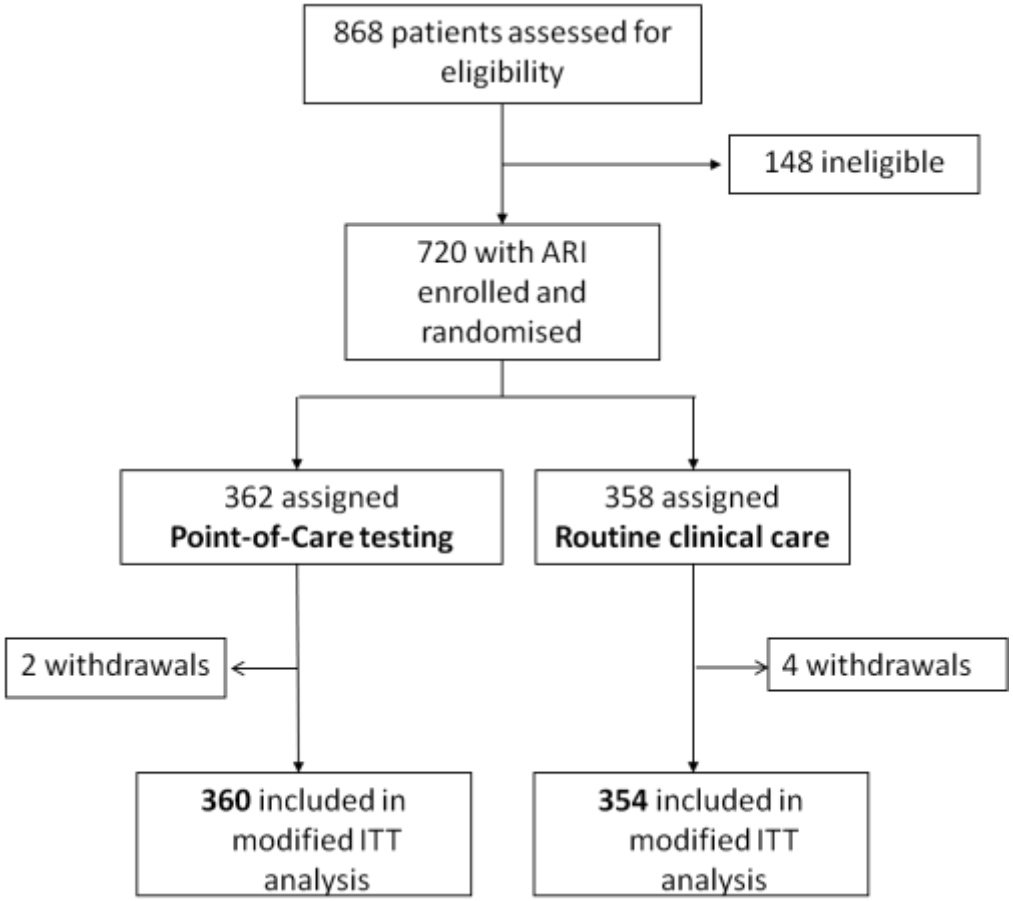
Trial profile



Baseline participant characteristics

	POCT (n=360)	Control (n=354)
Female sex	183 (51%)	185 (52%)
Current smoker	92 (26%)	89 (25%)
Influenza vaccine (current season)	206 (57%)	208 (59%)
Duration of symptoms (days)	4 (2 – 6)	4 (3 – 5)
Respiratory comorbidity	213 (59%)	206 (58%)
Cardiovascular comorbidity	132 (37%)	133 (38%)
Systolic BP (mmHg)	130 (118-149)	133 (120-152)
Heart rate (bpm)	100 (85-110)	100 (84-110)
Respiratory Rate	23 (19-28)	22 (18-26)
Final diagnoses (asthma, IECOPD, pneumonia, ILI/NPLRTI, other) matched to within 2% between groups		
Data: *N (%) or median (IQR)*		

Over winters 2014/15 & 2015/16

ResPOC: Primary outcome

The proportion of patients treated with antibiotics during admission or within 30 days of admission, whichever was shortest.

	POCT (n=360)	Control (n=354)	Risk difference (95%CI)	Unadjusted OR (95%CI)	Adjusted OR (95%CI)	*p*-value
Antibiotics given	**301 (84%)**	**294 (83%)**	0.6% (-4.9 to 6.0)	1.04	0.99 (0.57 to 1.70)	**0.96**

ResPOC: Primary outcome *post-hoc* analysis of those not on antibiotics when POCT results available

	POCT (n=120)	Control (n=167)	Difference (95% CI)	Odds ratio (95% CI)	NNT (95% CI)	p value
Antibiotic given	**61 (51%)**	**107 (64%)**	-13·2% (-24·8 to -1·7)	0·6 (0·4 to 0·9)	**8** (4 to 59)	**0·0289**

ResPOC: Key secondary antibiotic-related outcomes

Antibiotics	POCT (n=360)	Control (n=354)	Difference (95%CI)	Odds Ratio (95%CI)	*p*-value
Single dose only	**31/301 (10%)**	**10/294 (3%)**	6.9 (2.9 to 11.0)	3.3 (1.6 to 6.7)	**0.001**
Given for <48 hours	**50/301 (17%)**	**26/294 (9%)**	7.8 (2.5 to 13.1)	2.0 (1.4 to 3.4)	**0.0047**
Duration (days)	7.2 (5.1)	7.7 (4.9)	-0.4 (-1.2 to 0.4**	0.9 (0.8 to 1.0) ***	0.17*

Data are n (%) or mean (SD)
*Adjusted odds ratio
**Mean difference
***Adjusted Rate ratio

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ResPOC: Antibiotic use exacerbations of asthma and COPD

		POCT (n=360)	Control (n=354)	Difference (95%CI)	*p*-value
Asthma	Antibiotics given	43/62 (69%)	36/57 (63%)	6.2% (−10.5 to 22.6)	0.56
	Single dose only	**14/43 (33%)**	**3/36 (8%)**	24.2% (6.1 to 40.1)	**0.0125**
	<48 hours	**18/43 (42%)**	**4/36 (11%)**	30.8% (11.2 to 47.0)	**0.0026**
	Duration (days)	**3.9 (3.4)**	**5.3 (2.3)**	-1.4 (-2.7 to -0.1)	**0.0382**
COPD	Antibiotics given	75/81 (93%)	75/83 (90%)	2.2 (-6.9 to 11.4)	0.78
	Single dose only	7/75 (9%)	3/75 (4%)	5.3% (-3.2 to 14.4)	0.33
	<48 hours	**11/75 (15%)**	**3/75 (4%)**	10.7% (1.2 to 20.7)	**0.0462**
	Duration (days)	**6.1 (3.2)**	**8.0 (5.0)**	-1.9 (-3.2 to -0.5)	**0.0078**

Data are n/N (%) or mean (SD).

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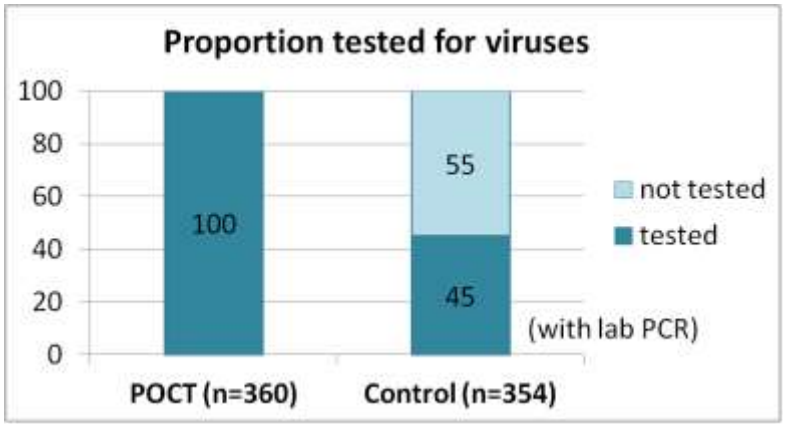
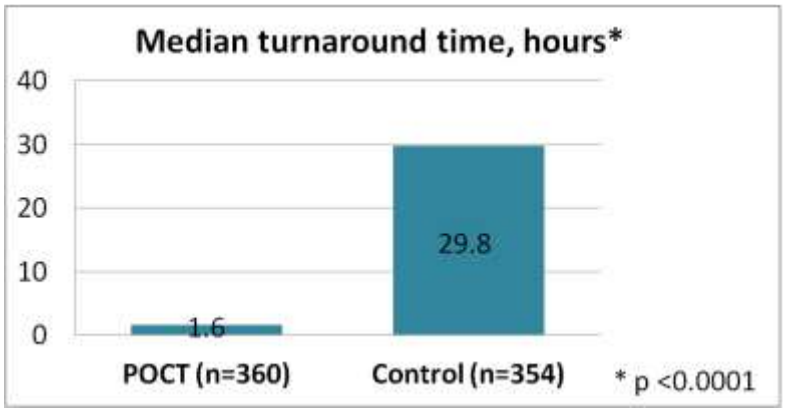
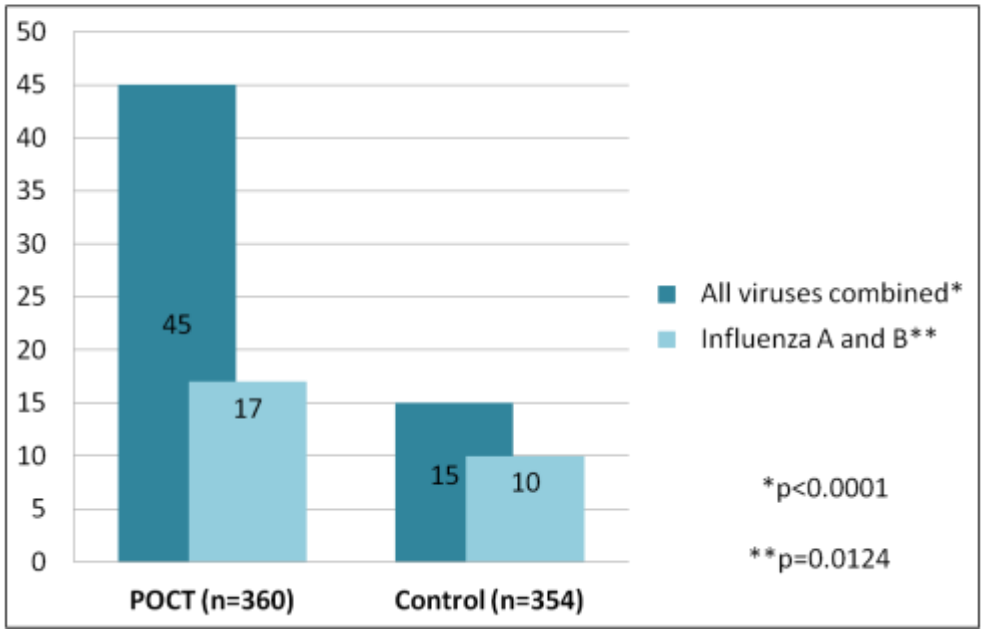
ResPOC: How do we know that antibiotics are being stopped early due to the POCT?







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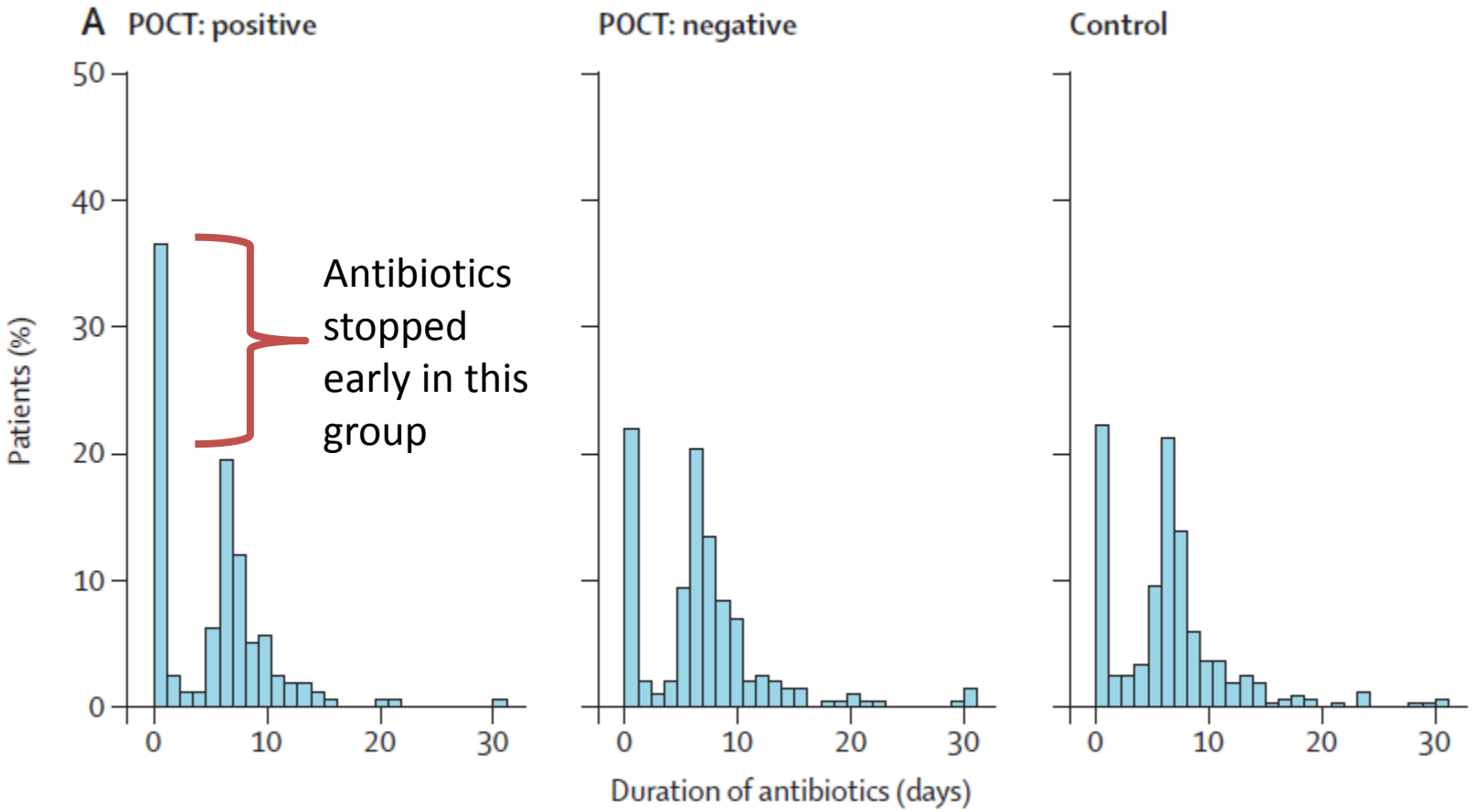

ResPOC: Adverse events

	POCT (n=360)	Control (n=354)	Difference (95%CI)	Odds ratio (95%CI)	p-value
Any adverse event (total)	77 (21%)	88 (25%)	-3.5% (-9.7 to 2.7)	0.82 (0.6 to 1.2)	0.29
HDU admission	6 (2%)	3 (1%)	0.8% (-1.2 to 2.8)	1.98 (0.5 to 8.0)	0.33
ICU admission	11 (3%)	7 (2%)	1.1% (-1.2 to 3.4)	1.56 (0.6 to 4.1)	0.36
Died within 30 days	9 (3%)	16 (5%)	-2.0% (-4.7 to 0.6)	0.54 (0.3 to 1.2)	0.15
Re-presented within 30 days but not admitted	49 (14%)	49 (14%)	0.2% (-4.8 to 5.2)	0.98 (0.6 to 1.5)	1.00
Readmitted within 30 days	45 (13%)	55 (16%)	-3.0 (-8.3 to 2.1)	0.78 (0.5 to 1.2)	0.28

HDU = Respiratory High Dependency Unit
ICU = Intensive Care Unit

ResPOC Conclusion

Molecular point-of-care testing for respiratory viruses in adults presenting to hospital with acute respiratory illness does not reduce the proportion of patients given antibiotics

There was an improvement in turnaround time and detection of viruses

It did lead to a reduction in antibiotic duration and an increased use of brief courses in exacerbations of asthma and COPD

This appears safe

Wide-ranging benefits of molecular point-of-care testing for respiratory viruses

Clinical benefits in

- **neuraminidase inhibitor use**
- **isolation room use**
- **length of hospital stay**

Please see ePoster **#EV0593** (abstract #3532, Malachira *et al.*)

Brendish NJ, Malachira AK, Armstrong L, Houghton R, Aitken S, Nyimbili E, Ewings S, Lillie PJ, Clark TW. Routine molecular point-of-care testing for respiratory viruses in adults presenting to hospital with acute respiratory illness (ResPOC): a pragmatic, open-label, randomised controlled trial. *Lancet Respir Med*. 2017 Apr 6. pii: S2213-2600(17)30120-0 [Epub ahead of print]

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