

A rapid influenza test in hospitals could avoid unnecessary paediatric isolation bed days and save costs



Andres I Vecino-Ortiz^{1,2}, Rebecca E Glover¹, Adrian J Rabe¹, Sam T Douthwaite³, Simon D Goldenberg³, Elisabeth J Adams^{1,4}

1. Aquarius Population Health, London. 2. Johns Hopkins School of Public Health, Baltimore.
3. Guy's & St. Thomas' NHS Foundation Trust, London. 4. University of Bristol, Bristol.

For further information contact: Elisabeth Adams, elisabeth.adams@aquariusph.com, +44 (0) 207 993 2930

BACKGROUND

- Influenza is responsible for a significant clinical and economic burden in hospitals and in the community, especially among children.(1,2)
- To reduce nosocomial transmission, patients admitted to hospital with suspected influenza are presumptively isolated in a side room until microbiological confirmation is received from the laboratory.(3,4,5)
- However, isolation is costly for hospitals and the health system as a whole as it not only demands limited resources but also, if used inappropriately, prevents others who need isolation bays from obtaining them.(6,7) Appropriate use of point of care tests (POCTs) that give a faster microbiological result may improve bed management and potentially reduce isolation time.

AIMS

- To estimate the isolation days averted after implementing an influenza POCT on the acute paediatric respiratory ward or in Accident and Emergency (A&E).
- To estimate the associated costs of preventing unnecessary isolation bed days.

METHODS: DECISION TREE MODEL DESCRIPTION

- Three decision trees in Microsoft Excel were constructed, to represent true influenza positive and negative patients and their days in a non-isolation ward bed versus an or isolation bed, with associated costs.
 - Baseline: current management in which a centralised laboratory Respiratory Viral Panel (RVP) is performed (Figure 1).
 - POCT trees: using a POCT performed either on the ward or whilst the patient is still in the A&E (Figure 2).
- For each decision tree, we estimated the number of ward bed days and isolation bed days and their associated costs
- The total cost per tree was the sum of the costs all weighted branches, and then estimated the difference between baseline and each of the POCT scenarios.
- We assumed that all patients with suspected influenza at time of admission were presumptively isolated in line with best practice, and that subsequent test results would inform a patient's further bed placement on the ward or in an isolation room.

METHODS: PARAMETER ESTIMATES

Parameter	Value	Source
Test Characteristics		
POCT sensitivity	0.792	Douthwaite ST <i>et al</i> , 2015 (8)
POCT specificity	0.994	Douthwaite ST <i>et al</i> , 2015 (8)
RVP sensitivity	1	Assumption
RVP specificity	1	Assumption
Clinical Characteristics		
Number of patients with respiratory symptoms	300	Vecino-Ortiz <i>et al</i> , submitted
Prevalence of influenza in patients with respiratory symptoms	0.07	Vecino-Ortiz <i>et al</i> , submitted
Logistical Characteristics		
Average hospital stay (days)	3	Vecino-Ortiz <i>et al</i> 2016, submitted
Time in A&E before admission (days)	0.1458	Vecino-Ortiz <i>et al</i> 2016, submitted
Time to diagnosis RVP (days)	0.5	Douthwaite ST <i>et al</i> , 2015 (8)
Time to diagnosis POCT (days)	0.0625	Douthwaite ST <i>et al</i> , 2015 (8)
Costs		
RVP Test	£90	Assumption
POCT	£30	Assumption
Cost bed day regular ward (£)	650	DH Reference costs 2014-15 (9)
Cost bed day isolation ward (£)	715	Assuming 10% increased cost

FIGURE 1: BASELINE DECISION TREE USING A LABORATORY-BASED TEST

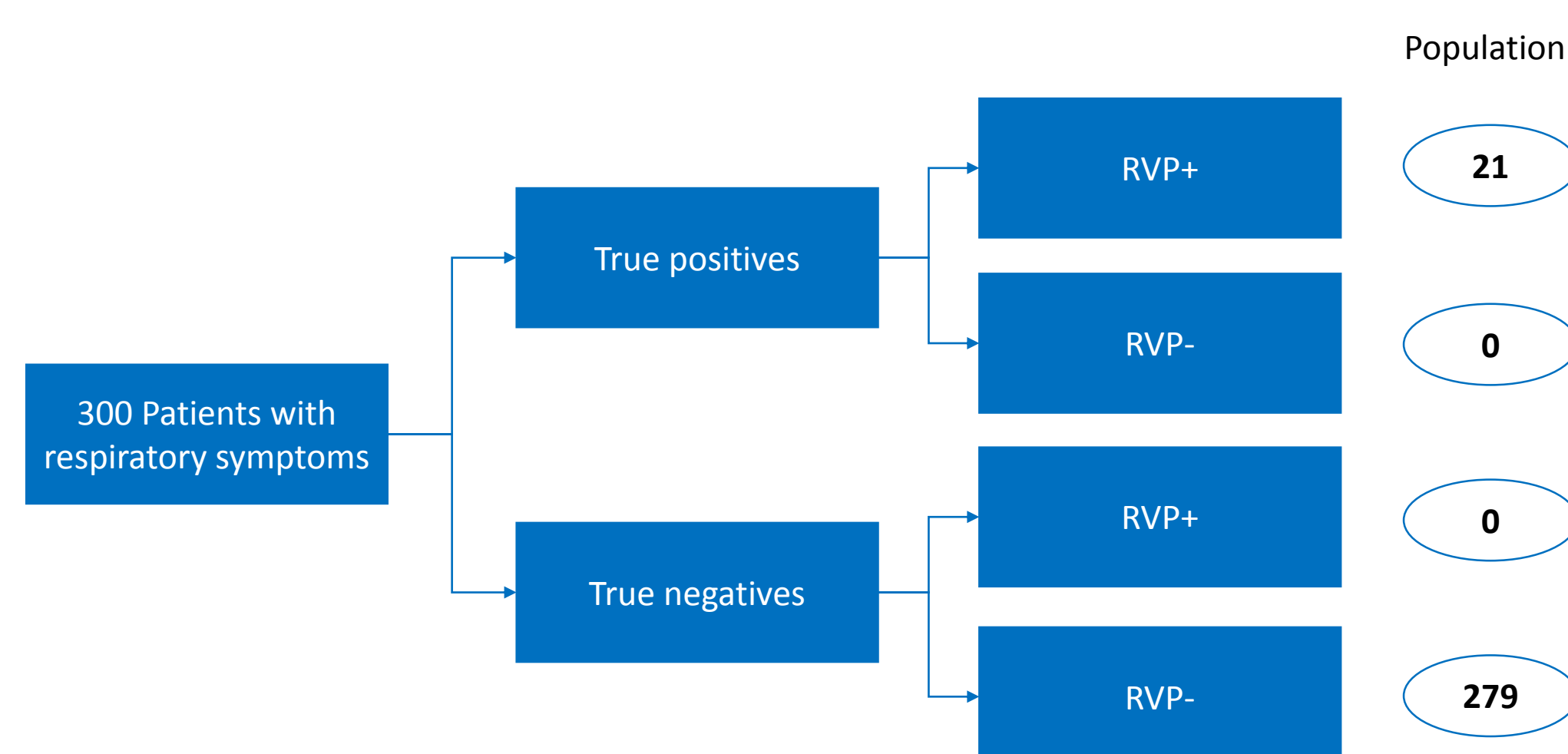
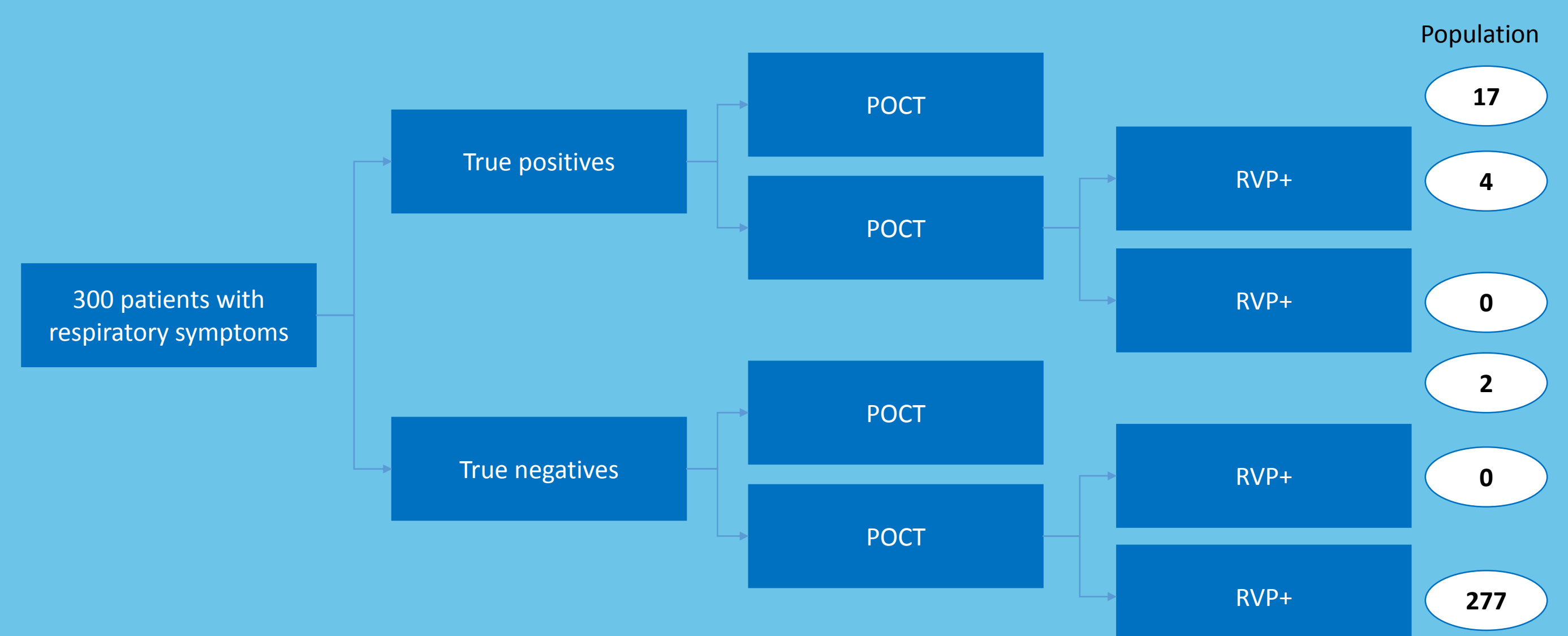


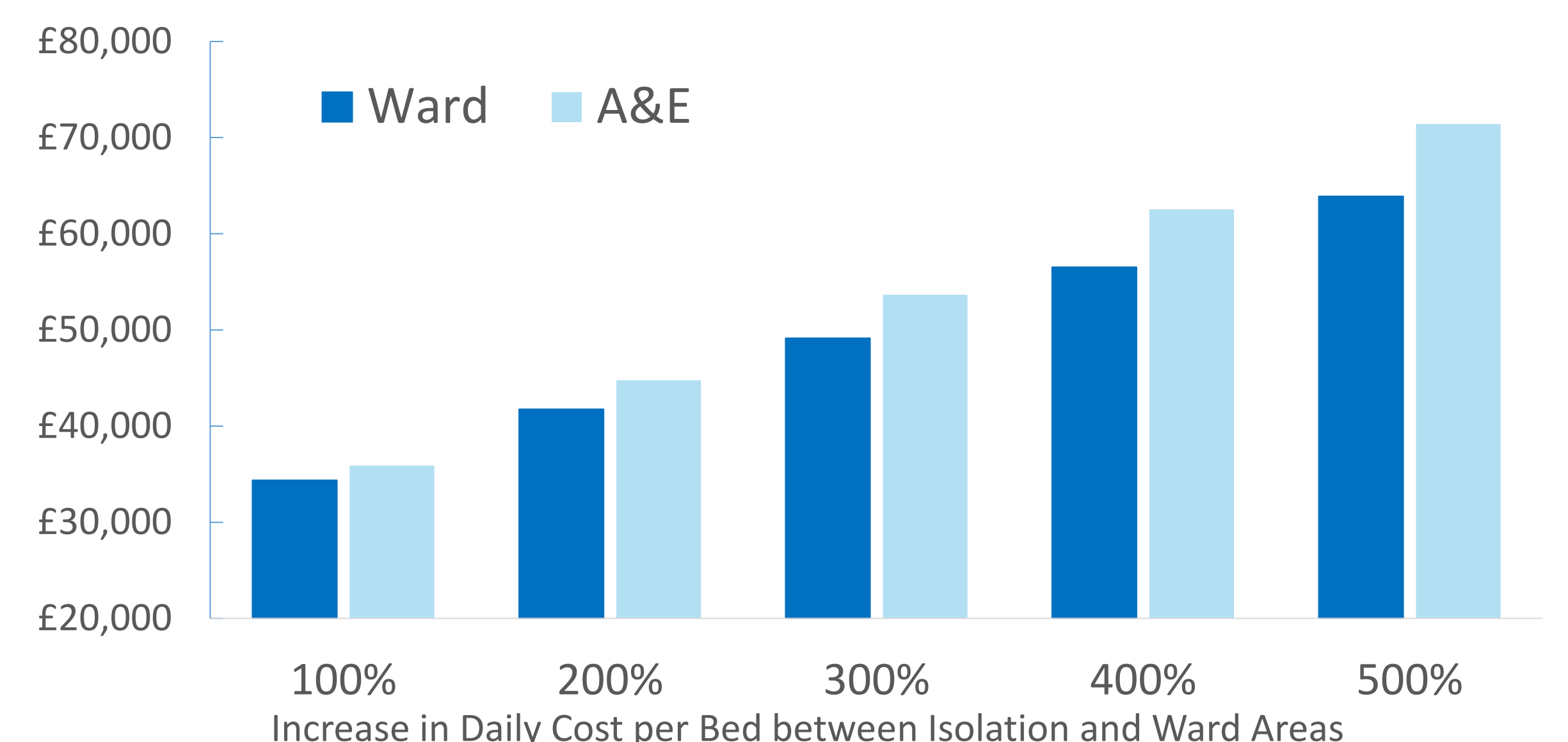
FIGURE 2: DECISION TREE USING A POCT FOR INFLUENZA IN A&E OR ON THE WARD



RESULTS

- In the baseline model, 140 unnecessary bed days would arise from a cohort of 300 patients. Implementing the POCT on the ward or in A&E has the potential to reduce this to 28 and 5 unnecessary isolation bed days, a reduction of 80% and 96%, respectively.
- Assuming that an isolation bed day costs 10% more than a general ward bed, the estimated total cost for our cohort was £598,163 at baseline; utilisation of a POCT on the ward or in A&E reduced total costs for the cohort to £590,782 and £589,279, respectively. This yields cost savings of £66 per isolation bed day averted if the test is placed in the ward or in A&E.
- Varying the additional cost of an isolation bed from 0% to 50%, led to estimated savings of up to £63,905 and £71,416 when the POCT was performed in the ward the A&E, respectively (Figure 3).

FIGURE 3: COST SAVINGS WITH A POCT ON THE WARD OR IN A&E, BY ISOLATION BED DAY COST



DISCUSSION

- A POCT in hospitals could prevent unnecessary isolation bed days so that they can be used for patients who require them, and hospitals could conserve this limited resource.
- If an isolation bed day costs more than a standard ward bed, this will lead to cost savings for the hospital, with 16% more savings if the POCT is placed in A&E compared to on the ward. However, the logistics of implementing it in A&E may make it impractical.
- A limitation of the study is that we assumed that all patients with suspected influenza would be managed presumptively and isolated. However, in actual practice clinicians may not follow guidelines and hence the results here may overestimate isolation bed day savings.

NEXT STEPS AND RECOMMENDATIONS

- More information is needed on the economic and opportunity cost of an isolation bed day compared to a general ward bed day.
- A time and motion study to audit the actual patient flow with and without a POCT would give data on how well hospitals are following guidelines to presumptively isolate patients with suspected influenza.
- The feasibility of implementing a POCT on the paediatric ward has been done, but more information about the feasibility of testing in A&E is needed.

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