

# HE Model for Sepsis POCT

1. To analyse the impact of a diagnostic test on the treatment of patients with sepsis, using patient data and expert elicitation
2. To build a business case to use POCT in A&E

**Key question:** How would the results of a procalcitonin POCT affect sepsis management in an emergency department setting

**Study population:** Adults who present at A&E and on initial assessment are identified as having 'query sepsis'

**Time horizon:** 12 months post initial hospital episode

**Intervention:** Sepsis six plus a Procalcitonin POCT

**Comparator:** Sepsis six

AB TREAT?*	[PCT]		
Diagnosis	<0.5	0.5 - 2	> 2
< 2 SIRS	No	Maybe?	Yes
> 2 SIRS	Maybe?	Yes	Yes
*Sepsis 5 plus Ab?			

# Quantifying the Economic Impact on Sepsis

## Patient Care

## Testing

Questions	Query	% Result?
1	ED majors with >2 SIRS	No linkage
2	ED minors with >2 SIRS	No linkage
3	>2SIRS at ED treated for sepsis	50 - 80
9a	>2 SIRS and high (2ug/L) PCT treated for sepsis	100
9b	>2 SIRS and intermediate (0.5 - 2) PCT treated for sepsis	60 - 90
9c	>2 SIRS and low (<0.5) PCT treated for sepsis	20
4	<2SIRS at ED treated for sepsis	0
10a	<2 SIRS and high (>2ug/L) PCT treated for sepsis	60 - 80
10b	<2 SIRS and intermediate (0.5 - 2) PCT treated for sepsis	0 - 10
10c	<2 SIRS and low (<0.5) PCT treated for sepsis	0
5	>2SIRS at ED treated for sepsis had sepsis	20 - 80
6	>2SIRS at ED NOT treated for sepsis had sepsis	0
7	Treated for sepsis had sepsis	50 - 70
8	NOT treated for sepsis had sepsis	0
11a	Length of stay if had sepsis and treated in ED	<10
11b	Length of stay if had sepsis but NOT treated in ED	<20
11c	Length of stay if NOT sepsis but treated in ED	<10
11d	Length of stay if NOT sepsis and NOT treated in ED	<10
12a	Mortality if sepsis and treated	20
12b	Mortality if sepsis but NOT treated	40
12c	Mortality if NOT sepsis but treated	<10
12d	Mortality if NOT sepsis and NOT treated	0
13a	12 month survival after sepsis and ED treatment	60
13b	12 month survival after sepsis but NO ED treatment	20 - 80
13c	12 month survival after NO sepsis but ED treatment	90
13d	12 month survival after NO sepsis and NO ED treatment	90

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# Sepsis Simulation - Aim

- ❑ Simulate probability of infection and progression to sepsis from hospital arrival to 12 months post admission
- ❑ Test impact of improvement strategies e.g. Sepsis Six and point of care testing
- ❑ Generate evidence for business case for change
- ❑ Allow easy localisation of key parameters so model can be used in different hospital trusts

### Sepsis Model Assumptions

POC PCT Test	Cut-off#	Correlation Lab Test		
<2SIRS	2.0ug/L	$r^2 = 0.97$	Treat? Expert elicitation moves <i>from 0% to 60-80%</i>	
>2SIRS	0.5ug/L	$r^2 = 0.96$	Treat?: Expert elicitation moves <i>from 50 - 80% to 80 - 100%</i>	
Venous	30 min TAT	30 min draw	Q: Resource = 1 nurse	
Capillary	30 mins TAT	0 mins draw	No resource need	
Q: Any situation with need to confirm with PCT lab test?				
<b>Diagnosis</b>				
Without test	2h from major	4h from minor		
With test	30 mins from m	1h from minor		
<b>Treatment initiation</b>				
Without test	3h from major	5h from minor		
With test	1h from major	2h from minor		
<b>Treatment duration</b>				
	<b>&lt;2 SIRS</b>	<b>&gt; 2SIRS</b>		
Without test	10 days	20 days		
With test	5 days	10 days		
<b>Progression</b>				
Without test	8% per hour			
With test	4% per hour			
Patient receiving appropriate treatment does not progress				
<b>Length of stay</b>				
	<b>ITU</b>	<b>EAU</b>	<b>GW</b>	
Without test (7.4 ave L	6 days	3 days	20 days	
With test	2 days	1 days	5 days	
<b>Mortality Rates</b>				
		<b>During Hospital</b>	<b>12 months</b>	
Sepsis (>2 SIRS) and treated in ED	~20%	~60% survival	From expert elicitation	
Sepsis (>2 SIRS) and NOT treated in ED	>40%	~60% survival	From expert elicitation	
No sepsis (<2 SIRS) and treated in ED	<10%	~90% survival	From expert elicitation	
No sepsis (<2 SIRS) and NOT treated in	~0%	~90% survival	From expert elicitation	
<b>Costs</b>				
	<b>ITU</b>	<b>EAU</b>	<b>GW</b>	<b>Test cost</b>
Without test	£3000 per day	£2000 per day	£1000 per day	
With test	£3000 per day	£2000 per day	£1000 per day	£15 (capillary), £15 plus resource (venous)
Per Instrument costs	£1,500			
Instruments/ ward	3	3	5	
Sepsis 6.1 - Oxygen				
Sepsis 6.2 - Lactate				
Sepsis 6.3 - Culture				
Sepsis 6.4 - Urinalysis				
Sepsis 6.5 - IV fluid				
Sepsis 6.6 - Antibiotics	Q: £100 per day	£100 per day	£100 per day	

# Assumptions including test characteristics

Sample	Cut-off	R2	Sens*	Spec*
Venous	0.25		0.97	0.93
	0.5		0.97	0.98
	2		0.97	0.94
Capillary	0.25		0.96	0.88
	0.5		0.96	0.94
	2		0.96	0.97

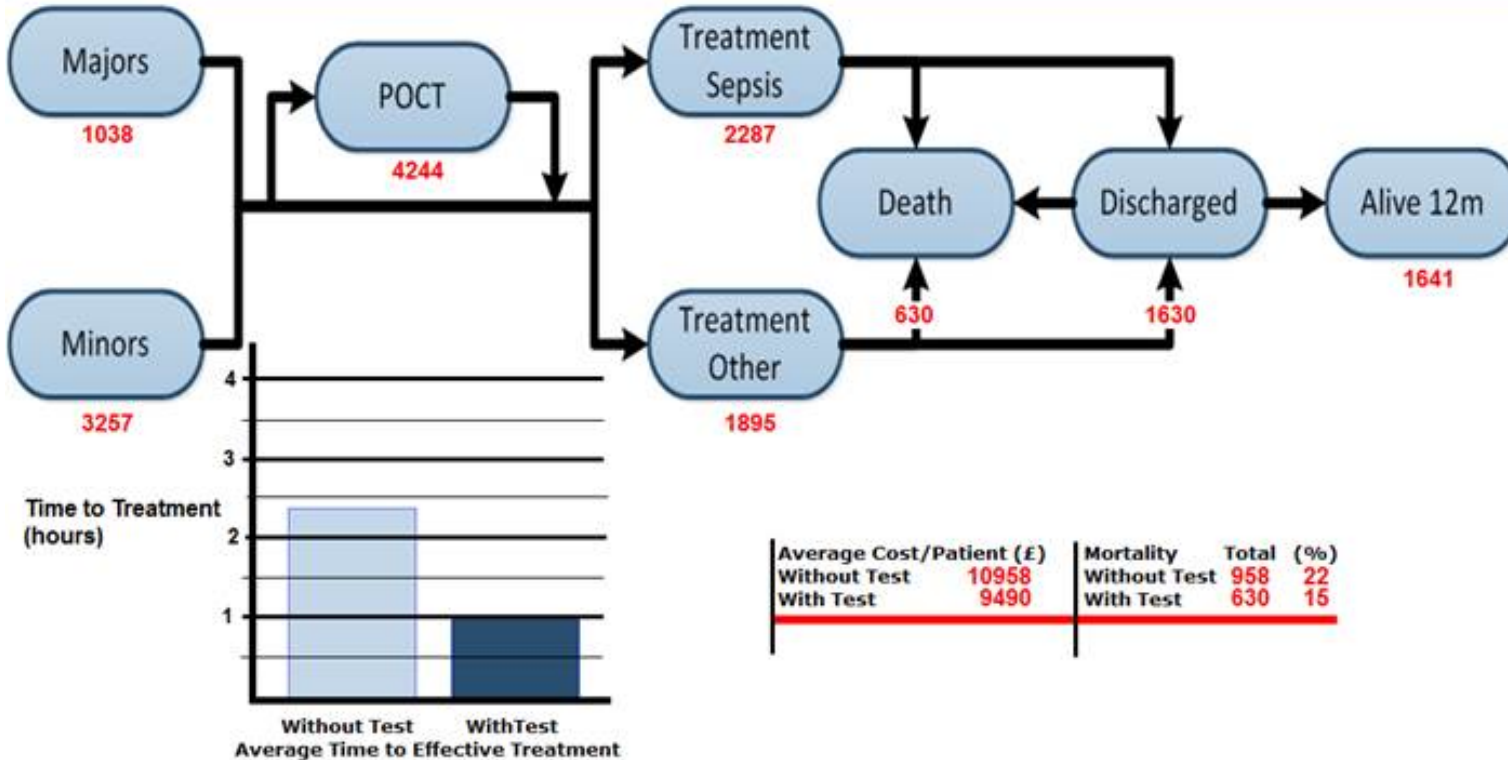
\*Vs lab PCT test

PCT is ~ 80% sens, spec



# Results - 1

## Sepsis POCT Simulation



- Settings
- Costs
- Test
- Run
- Results
- Model
- Reset

