

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?			
Diagnosis			
Without test	2h from major	4h from minor	
With test	30 mins from m	1h from minor	
Treatment initiation			
Without test	3h from major	5h from minor	
With test	1h from major	2h from minor	
Treatment duration			
	<2 SIRS	> 2SIRS	
Without test	10 days	20 days	
With test	5 days	10 days	
Progression			
Without test	8% per hour		
With test	4% per hour		
Patient receiving appropriate treatment does not progress			
Length of stay			
	ITU	EAU	GW
Without test (7.4 ave L	6 days	3 days	20 days
With test	2 days	1 days	5 days
Mortality Rates			
	During Hospital		12 months
Sepsis (>2 SIRS) and treated in ED	~20%		~60% survival
Sepsis (>2 SIRS) and NOT treated in ED	>40%		~60% survival
No sepsis (<2 SIRS) and treated in ED	<10%		~90% survival
No sepsis (<2 SIRS) and NOT treated in	~0%		~90% survival
Costs			
	ITU	EAU	GW
Without test	£3000 per day	£2000 per day	£1000 per day
With test	£3000 per day	£2000 per day	£1000 per day
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

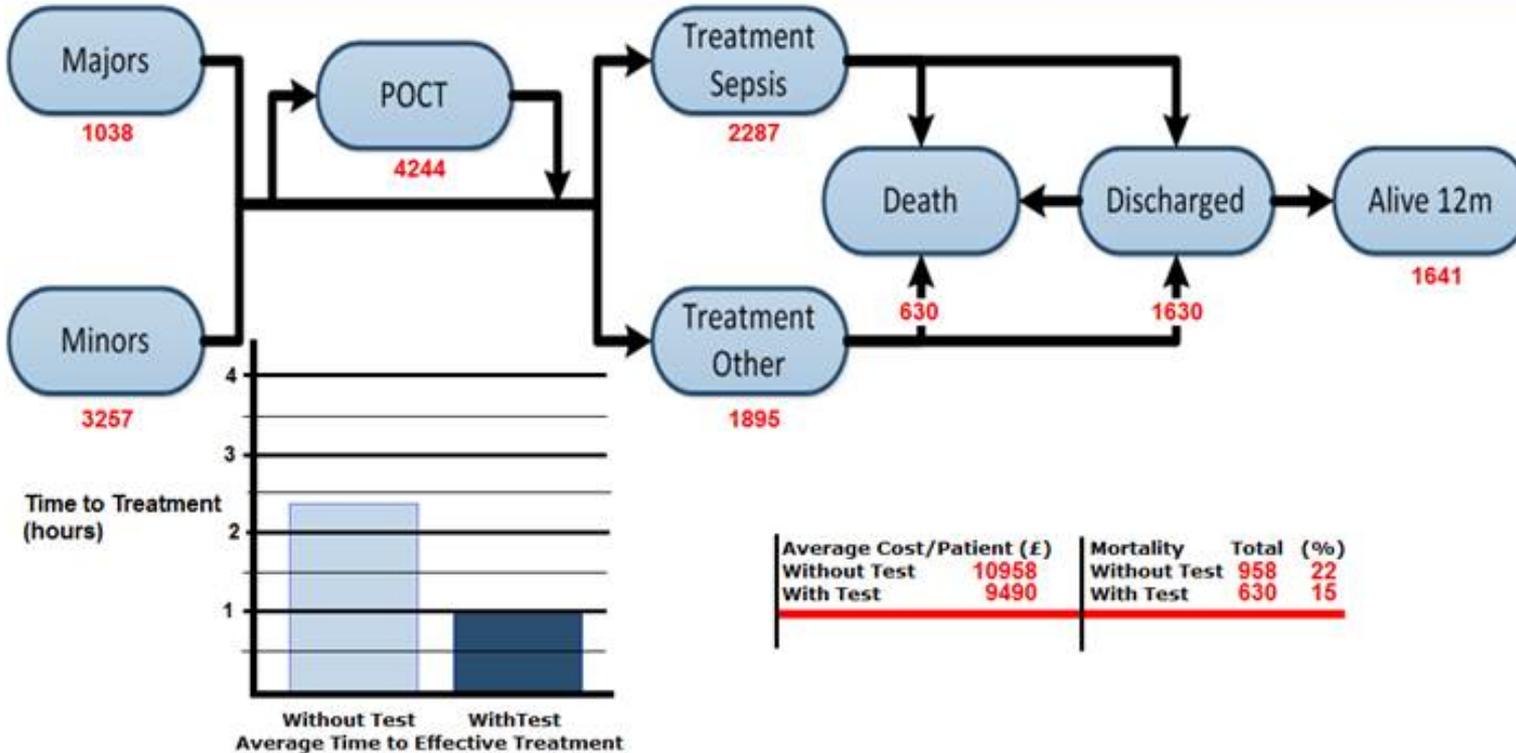
*Vs lab PCT test

PCT is ~ 80% sens, spec



Results - 1

Sepsis POCT Simulation



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

