

# The Costs of Severe Sepsis; The Netherlands, 2000

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## Introduction

Severe sepsis is a major complication of infection. It is associated with a high mortality rate and intensive care treatment is almost always indicated. Within the ICU, the impact on resource consumption is high. E.g. it has been reported that while severe sepsis patients constituted only 24% of the ICU population, 52% of all ICU expenses were attributable to them.<sup>1</sup> Recently, the results of a new agent for the treatment of severe sepsis have come available,<sup>2</sup> and other treatments are in development. These events may change the future burden of sepsis and estimates of current treatment costs, annual incidence and the national burden-of-illness are useful.

## Objective

To determine the direct medical costs of treatment and the burden-of-illness of severe sepsis in the Netherlands in 2000.

## Results

Table 1: patient characteristics (n=100) (mean ± SD)

Age (years)	Male	APACHE II	Predicted mortality
69 ± 15	67%	22 ± 7	46 ± 20
Septic shock	ICU mortality	Hospital mortality	ICU LOS (days)*
68%	22%	39%	15.3 ± 15.8

After 28 days, 31% of the patients had died, 11% was still admitted to the ICU, 26% was in a general ward and 32% had been discharged from the hospital (figure 1).

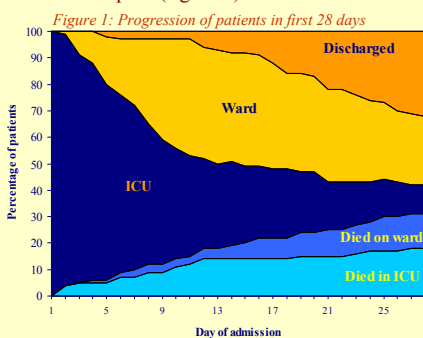


Table 3: Outcomes in several subgroups

	Consumption costs (€/day)	Nursing costs (€/day)	ICU LOS (days)	Treatment costs (1000 €)
No shock (n=32)	250 ± 218	290 ± 79	8.3 ± 8.8	9.8 ± 8.9
Shock (n=68)	389 ± 434***	381 ± 66***	18.6 ± 19.1*	24.5 ± 33.5**
No renal failure (n=86)	281 ± 262	344 ± 81	12.2 ± 13.3	14.8 ± 17.1
Renal failure (n=14)	547 ± 576***	399 ± 75*	34.1 ± 34.6***	46.4 ± 36.2***
ICU survivors (n=78)	314 ± 347	330 ± 68	14.2 ± 14.7	17.0 ± 20.7
ICU non-survivors (n=22)	499 ± 514***	430 ± 81***	19.1 ± 19.5*	31.6 ± 65.9*

\*P<0.05, \*\*P<0.01, \*\*\*P<0.001, †P=0.432, ‡P=0.059

## Conclusion

The costs of severe sepsis – limited to the costs on the ICU - are estimated at €19,509 per patient. With an annual incidence of over 8600 cases, the ICU costs of severe sepsis in the Netherlands is estimated at more than €168 million per year, representing 1.7% of the national hospital budget and 0.40% of the national expenses on healthcare in 2000.

## Methods

Cost (direct medical) and clinical data were collected for 100 patients admitted to a ten bed general hospital ICU from '98 to '00 for treatment of a first episode of severe sepsis. Costs were calculated as the sum of fixed and variable costs. Fixed costs were derived from the national costing guideline<sup>3</sup> and ICU specific information. Variable costs were collected with an activity based information system and consisted of nursing costs based on TISS-28 points (Therapeutic Intervention Scoring System) and 'consumption' costs. Septic shock was defined as the need for vasopressor therapy during admission.

All costs were indexed to 2000 using health specific price indices.

The annual incidence of severe sepsis was estimated with a point-prevalence survey in 47 Dutch ICU's, collecting the clinical information concerning all patients at the ICU during a 24 hour period.

The age distribution of the patients was skewed to the left, and median age was 71 years. The most common site of infection was the lung in 52%, followed by the abdomen in 31% of the cases.

ICU LOS (table 1) was estimated to be geometrically distributed. Additional stay on a general ward lasted on average 18.2 ± 17.2 days. Shock, renal failure, infection from the abdomen and nursing intensity (TISS/day) were significantly associated with ICU LOS ( $R^2=0.272$ ,  $P<0.001$ ). The reported P values are associated with the regression's F-statistics. ICU LOS differed significantly between subgroups (table 3).

Patients consumed on average 30.6 ± 7.1 TISS points per day and 469 ± 565 per admission. Costs per TISS-point per day were calculated at €11.3. Daily direct medical costs (table 2) were estimated to be log-normally distributed and varied significantly between subgroups (table 3). Stepwise linear regression analysis indicated significant though minor associations with renal failure, day of admission, shock, ICU survival, source of infection (abdomen, urinary, other) and age ( $R^2=0.235$ ,  $P<0.001$ ).

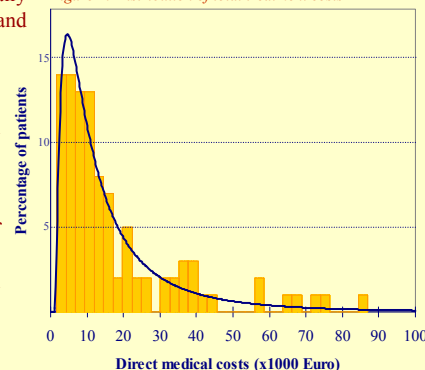
Total treatment costs were estimated to be log-normally distributed (figure 2) with a mean of €19,509 ± 26,966 and correlated highly with ICU LOS ( $R^2=0.90$ ,  $P=0.01$ ).

Renal failure, abdominal infection and shock showed associations in regression analysis ( $R^2=0.322$ ,  $P<0.001$ ). Total treatment costs were significantly higher in case of shock and/or renal failure (table 3). This trend was also observed in ICU non-survivors.

Table 2: Daily treatment costs

	Costs per day (€)
<b>Fixed costs</b>	
Food	17
Laundry and linen	8
Cleaning and housing	68
Overhead and equipment	192
Administrative ICU staff	46
Medical staff	202
<b>Total</b>	<b>533</b>
<b>Nursing costs</b>	<b>344 ± 80</b>
<b>Consumption costs</b>	
Diagnostics	94 ± 79
Medication	67 ± 168
Blood and bloodproducts	46 ± 199
Renal replacement therapy	58 ± 208
Haemodynamic monitor	18 ± 77
Mechanical ventilation	18 ± 66
Other	69 ± 74
<b>Total</b>	<b>359 ± 396</b>
<b>Daily direct medical costs</b>	<b>1236 ± 404</b>

Figure 2: Distribution of total treatment costs



## References

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