

Incremental cost due to nosocomial infections

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Background

The incidence of nosocomial infections is an important quality indicator. Nosocomial infections complicate hospital care, increase resource consumption and may even lead to the patient's death. The cost associated with nosocomial infections is usually assessed through the number of days exceeding the normal length of stay. To effectively calculate the cost associated with nosocomial infections, an exhaustive register and a cost information system are required, which would allow the assessing the variability of cost per patient to be assessed according to their clinical characteristics.

Objective

To quantify the incremental hospital cost related to the incidence of nosocomial infections.

Methods

Design: Incremental cost analysis.

Setting: A public teaching hospital in the city of Barcelona (Spain).

Sources of information:

- Minimum Data Set
- The Hospital costs information system. The overall cost analyzed was 54.7M€.
- The register of bacteraemias and infections due to multiresistant microorganisms in 2003. This register included 216 bacteraemias and 323 infections due to multiresistant microorganisms, corresponding to 470 patients from a total of 15,870 patients admitted to the hospital.

Main outcome measures:

1. Incremental cost. The incremental cost per patient due to nosocomial infections was calculated by subtracting the mean cost of patients without infection from the cost related to patients with nosocomial infection by diagnosis-related group (DRG). That is, $\text{Sum}(\text{Cost}_j \text{DRG}_j - \text{Mean Cost DRG}_i)$ where j is the infected patient and i identifies the DRG).

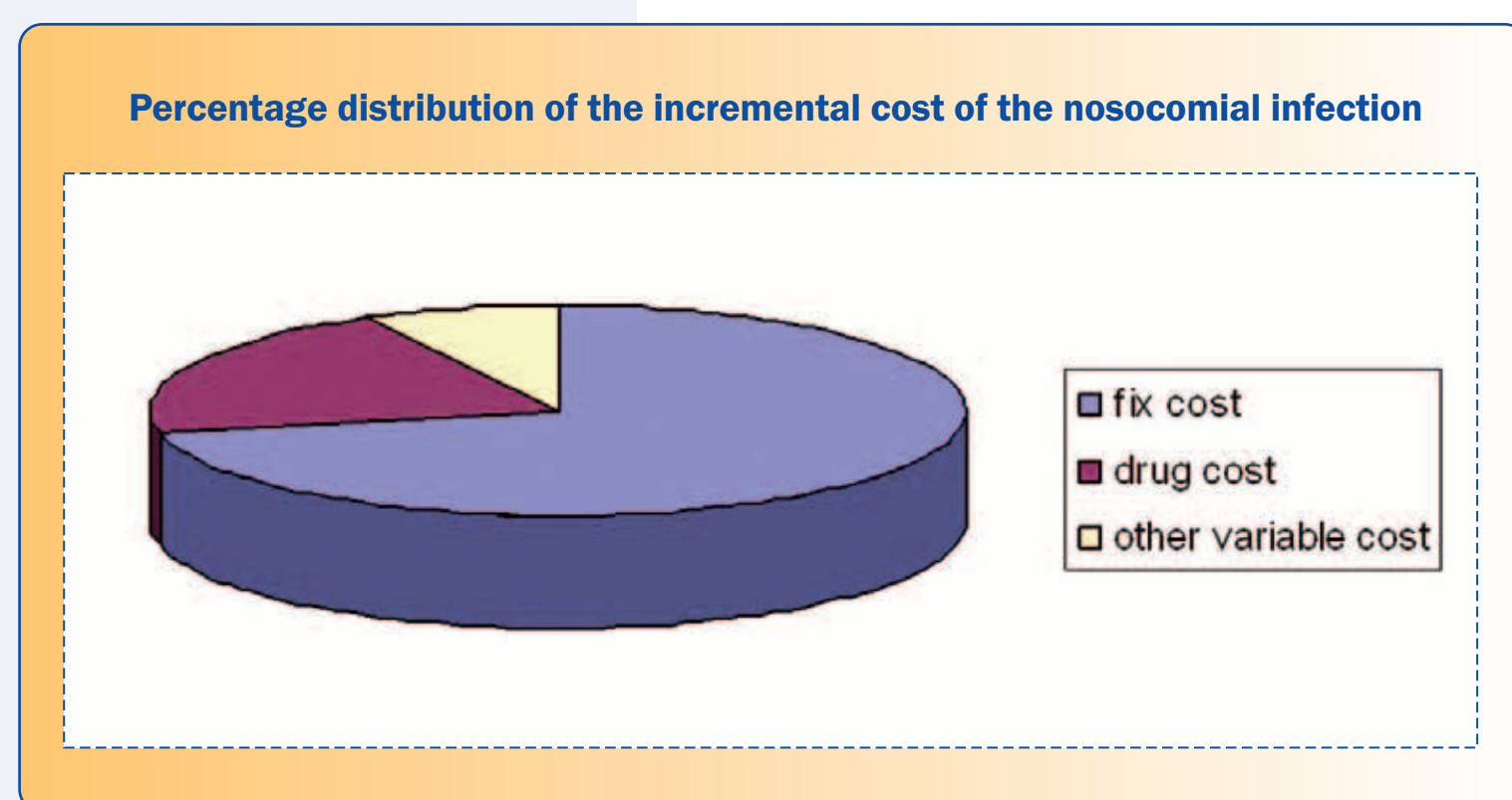
2. Multivariate adjusted incremental cost. The incremental cost per patient of the 15,780 patients was adjusted by the occurrence of nosocomial bacteraemia, nosocomial infection due to multiresistant micro-organisms, community-acquired bacteraemia, and community-acquired infection due to multiresistant microorganisms. As covariates, the model included admission to the intensive care unit (ICU), admission through the emergency room, and death. The model was alternatively adjusted by the relative cost of the 3M All Patient Refined (APR)-DRG and the APR-DRG severity indicator; or the cost Centers for Medicare and Medicaid Services (CMS)-DRG V20 and Elixhauser comorbidities index. To normalize the distributions, all cost variables were log-transformed.

Results

Summary of the analyzed information	Year 2003	
	N	%
Inpatients	15,87	
Patients with nosocomial infection	470	3.0
Incremental cost per patient M €.	4.7	8.6

Incremental unit costs	Infection	Average cost	Unit
	incremental cost	without infection	costs ratio
Total cost	9,912	3,286	4.0
Fixed cost	7,087	2,596	3.7
Variable cost	2,825	690	5.1
Drug cost *	2,046	155	14.2

*Part of variable cost



Multivariate incremental cost analysis	Elasticity (%)	
	Total costs	Drug costs
Nosocomial bacteraemias	+66	+214
Nosocomial infection by multiresistant microorganisms	+68	+188
Community bacteraemias	+17	+81
Community infection due to multiresistant microorganisms	+45	+121
Complexity	+62	+69
Comorbidity	+13	+51
Exitus	-15	+39
Age	+16	+41
UCI	+12	+26
Admission through the emergency room	+10	+93
R2	45%	38%

Conclusions

There is an important incremental cost associated with the incidence of nosocomial infections. This value should be interpreted as an indicator of poor quality and represents the amount that could be spent in quality improvement (infection control). Hospital-acquired infection increases the usual cost of hospital care by four-fold, adjusted by clinical and sociodemographic characteristics and also increases mortality. By taking the costs associated with nosocomial infections into account, we were able to quantify the effects of not guaranteeing safety, a basic objective of hospital care.