

DECISION ANALYSIS AND COST OF THE MEDICAL TREATMENTS THE CASE OF THE LOW MOLECULAR WEIGHT HEPARINS IN FRANCE

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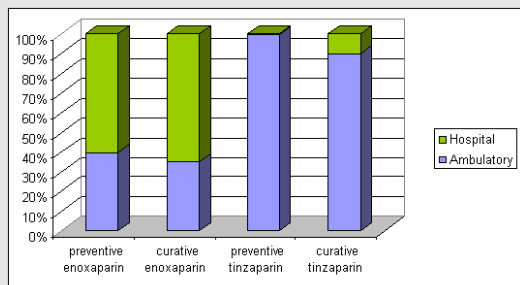
INTRODUCTION : The aim of the study is to emphasize the need of a global economic approach in France taking into account both hospital and ambulatory costs when comparing the price of two drugs from the decision makers view point. When comparing the price of two drugs, the results could change according to the segment considered. As an example we considered the first two Low Molecular Weight Heparins (LMWH) in terms of market share in France: enoxaparin and tinzaparin.

OBJECTIVES : To evaluate and to compare the costs of enoxaparin and tinzaparin from the ambulatory point of view and from the whole society.

DATA & METHODS

Different market shares for enoxaparin and tinzaparin sales

Enoxaparin and tinzaparin have two indications: preventive and curative ; they can be sold on the ambulatory market or at the hospital.



Unit price of syringes c_{ij}

Enoxaparin is sold at a very low price in hospitals whereas tinzaparin is expensive for this market.

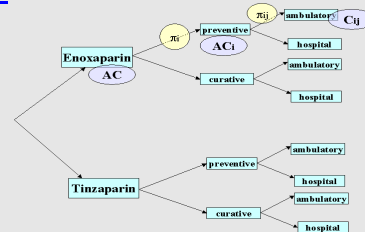
• **Unit ambulatory price** (Journal Officiel 2002 and 2003¹⁻²).

Product	Cost per srg (€)	sales %	Average weighted cost / srg (€)
Preventive dosages			
Tinzaparin 2500	2.20	20%	3.63
Tinzaparin 3500	3.30	30%	
Tinzaparin 4500	4.40	50%	
Enoxaparin 2000	2.73	25%	4.77
Enoxaparin 4000	5.45	75%	
Curative dosages			
Tinzaparin 10000	8.77	30%	10.85
Tinzaparin 14000	10.90	50%	
Tinzaparin 18000	13.83	20%	
Enoxaparin 6000	6.28	70%	6.59
Enoxaparin 8000	7.03	25%	
Enoxaparin 10000	8.75	5%	

• **Unit hospital price** (source catalogues AP-HP 2003):

Product	Preventive (€)	Curative(€)
Enoxaparin	0,001	0,001
Tinzaparin	2 [1.5;2.5]	3,29

Decision Tree



Comparison of two markets :

- Ambulatory sales: cost C_{ij} of a syringe for a product in indication i on a market j
- Ambulatory and hospital sales: average cost AC_i of a syringe for a product in indication i weighted by π_i , the market j weight.

$$AC_i = \sum_{j=1}^2 \pi_{ij} C_{ij}$$

Comparison of average total costs AC of products in all the indications :

$$AC = \sum_{i=1}^2 \pi_i AC_i$$

with π_i the weight of the indication i in the product sales.

BUT it is necessary to take into account the number of syringes prescribed per day.

Costs units

• **Daily total Cost (DTC)** : price weighted by the number of syringes per day.

It is a unit cost except for curative enoxaparin which needs 2 syringes \Rightarrow weighting by 2

• **1000 UI of anti-factor Xa activity cost**: ratio of a unit syringe price on the quantity of product UI multiplied by 1000

Product	1000 UI ambulatory cost (€)	1000 UI cost in Hospital (€)	Sales %	1000 UI average Hospital weighted cost (€)	1000 UI average weighted ambulatory cost (€)
Preventive dosages					
Tinzaparin 2500	0.8800	0.8	20%	0.55362	0.9477
Tinzaparin 3500	0.9429	0.5714	30%		
Tinzaparin 4500	0.9778	0.4444	50%		
Enoxaparin 2000	1.3650	0.0005	25%	0.000275	1.3631
Enoxaparin 4000	1.3625	0.0002	75%		
Curative dosages					
Tinzaparin 10000	0.8770	0.329	30%	0.25276	0.8061
Tinzaparin 14000	0.7786	0.235	50%		
Tinzaparin 18000	0.7683	0.1828	20%		
Enoxaparin 6000	1.0467	0.0003	70%	0.00027	0.9961
Enoxaparin 8000	0.8788	0.0002	25%		
Enoxaparin 10000	0.8750	0.0002	5%		

RESULTS

Ambulatory Segment

Product	DTC (€)	1000 UI average weighted cost (€)
Preventive dosages		
Tinzaparin	3.63	0.9477
Enoxaparin	4.77	1.3631
Curative dosages		
Tinzaparin	10.85	0.8061
Enoxaparin	13.18	0.9961

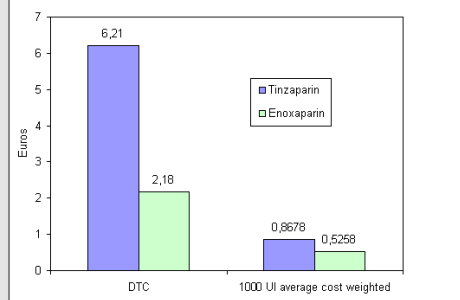
\Rightarrow Tinzaparin less expensive than enoxaparin

Ambulatory and Hospital Segment

Produit	DTC (€)	1000 UI average weighted cost (€)
Preventive dosages		
Tinzaparin	3,62	0,9457
Enoxaparin	1,91	0,5454
Curative dosages		
Tinzaparin	10,09	0,7508
Enoxaparin	4,62	0,3488

\Rightarrow Tinzaparin more expensive than enoxaparin

Societal costs comparison in all indications and segments



Sensitivity Analysis

• To modify the distribution of enoxaparin between ambulatory and hospital care until its DTC reaches the tinzaparin one from a societal point of view.

• To obtain an equivalent Daily Total Cost between enoxaparin and tinzaparin

\Rightarrow For **preventive dosage**, the enoxaparin ambulatory market share should be multiplied by 1.875. This implies a 75% market share of enoxaparin sales in ambulatory care instead of 40%.

\Rightarrow For **curative dosage**, the enoxaparin ambulatory market share should be multiplied by 2.171. That means it represents 76% of the enoxaparin sales in ambulatory care instead of 35%.

CONCLUSION : Segmentation of the health care system and practice of different prices according to the type of markets (ambulatory, hospital) prevent the public decision-makers from having a clear view of the real cost of the drugs from a societal point of view.

