

THE RELATIVE COST-EFFECTIVENESS OF THE FENTANYL HCL PATIENT-ACTIVATED TRANSDERMAL SYSTEM (ITS) IN ACUTE POST-OPERATIVE PAIN MANAGEMENT (POPM) IN GREECE

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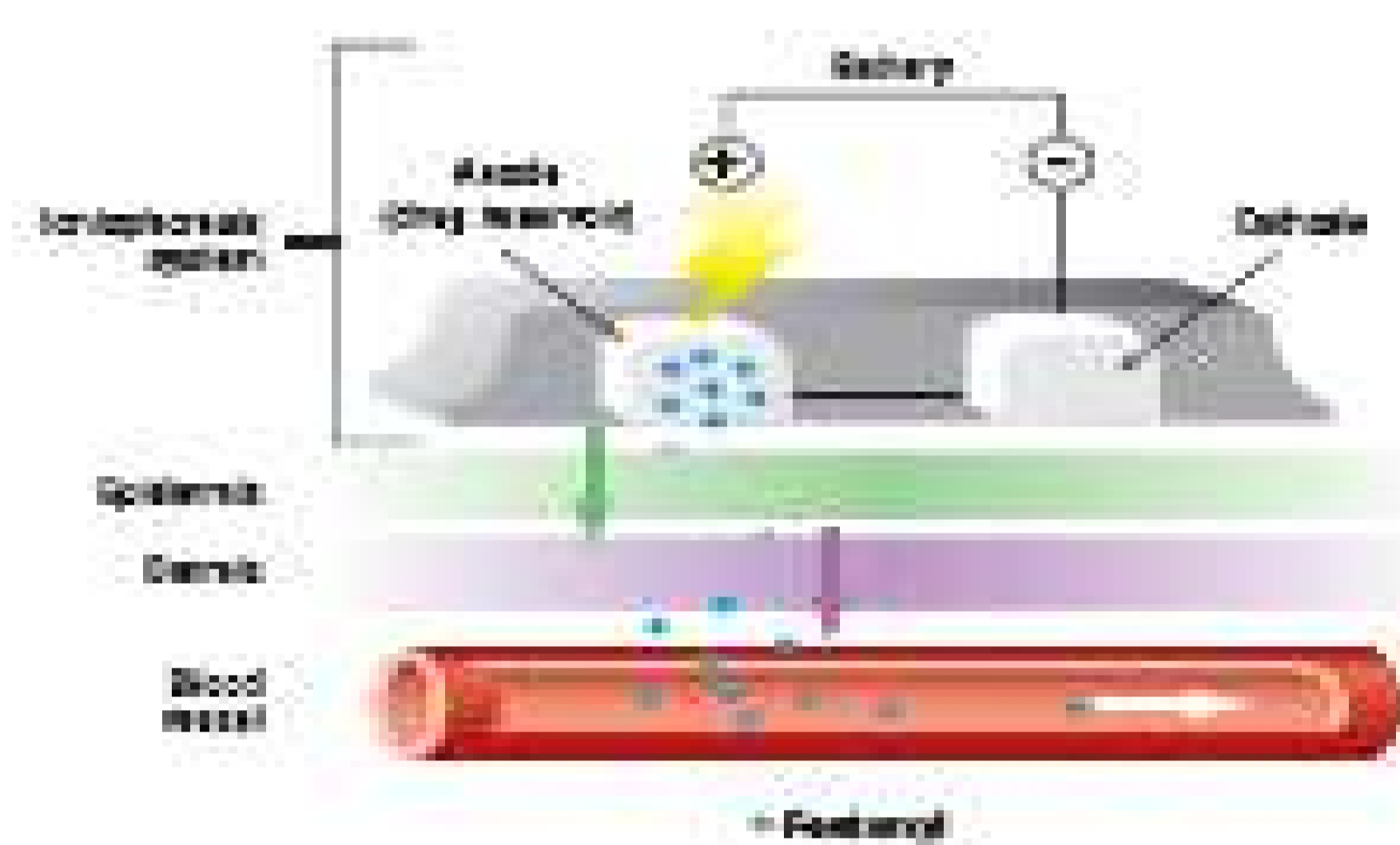
ABSTRACT

OBJECTIVES: This study evaluated the cost-effectiveness of ITS versus current POPM choices in Greece from the hospital perspective. **METHODS:** 249 surgeons and anaesthesiologists were interviewed to derive the most frequent treatment sequences for POPM for patients experiencing moderate to severe post-surgical pain. These were: a) 2 days intravenously administrated (IV) opioids, 2 days IV non opioids, 1 day oral non-opioids, b) 2 days intramuscularly administrated (IM) opioids, 2 days IV non-opioids, 1 day oral non-opioids, c) 2 days epidural, 3 days oral non-opioids. A decision analytic model was developed to estimate costs and effectiveness of each these sequential treatment arms, from surgery to discharge, compared with 2 days of ITS followed by 3 days of oral non-opioids. Effectiveness data were obtained from ITS trials and published literature. The resource utilisation was defined by the same physician interviews and a Delphi Panel of 40 Greek physicians. Costs included pain medication and cost of POPM-related complications not covered by or exceeding the daily reimbursed amount to the hospital, the hotel costs and finally staff time estimated during four European Delphi Panels¹. The complications' cost was estimated by the Greek Delphi panel. Sensitivity analyses ($\pm 30\%$) were performed on the cost of complications and staff time estimations. **RESULTS:** The probability of a successful treatment (adequate pain control and no complications) was 76% for ITS, 49% for the first two treatment sequences and 72% for the third. Total cost per patient was 677-717€ for ITS and €717, €704, €770 for the three sequences respectively. ITS was associated with reduced staff time and fewer complications. The model was robust with low-moderate sensitivity (± 10 change of base results). **CONCLUSION:** The treatment sequence of ITS dominated the currently practiced POPM treatments in Greece indicating that ITS cost was offset by savings resulting from reduced staff time and fewer complications.

INTRODUCTION

- ITS is a new and unique option for the treatment of acute post-operative pain that improves not only the pain relief, comfort and mobility of the patient, but also simplifies the process of care in the hospital by reducing both demands on staff time as well as the potential on medical errors.
- Iontophoresis, describes a non-invasive process in which a low-intensity imperceptible electric current is used to drive ionisable drug molecules across the stratum corneum, the layer of epidermis that poses the greatest barrier to transdermal drug administration, and into the systematic circulation. (Figure 1)
- Moreover, fentanyl presents the following advantages over morphine:
 - ♦ It has no active or toxic metabolites (more suitable for patients with renal impairment)
 - ♦ It does not induce histamine release (Lower risk of hypotension, pruritis, tachycardia and bronchospasm)

Figure 1. Iontophoretic fentanyl delivered by the fentanyl ITS



OBJECTIVE

The aim of the study is to evaluate the cost-effectiveness of ITS versus current POPM choices in Greece.

METHODS

- A decision analytic model was created to compare the most frequent POPM treatment sequences (Table 1) with a new treatment involving 2 days of ITS followed by 3 days of oral non-opioids. The model calculated the following parameters:
 - ♦ The therapeutic benefits for the patients, defined as the percentage of the patients who receive effective control of the pain and do not present complications.
 - ♦ The economic consequences for the hospital, defined as the total spending on post-operative analgesia and the spending on the treatment of its complications
 - ♦ The opportunity cost for the hospital resulting from the time saved by the doctors and nurses in the management of the post-operative pain.
- The study was conducted from the perspective of the hospital.
- The time horizon of the study was five days. The beginning of this period of time is represented by the first administration of post-operative analgesia and the end by the discharge from the hospital.
- For the collection of the data to populate the model a multi-centre study in both public and private hospital, including the interviews of 289 surgeons of different specialties and anaesthesiologists was conducted between June and August 2006.
- The data was collected by the process of interview using a standard questionnaire. The surgical procedures for which data was collected were the following: knee replacement, hip replacement, upper and lower extremity orthopedic, orthospinal, upper and lower abdominal, gynecological, genito-urinary and nephrological.
- For the statistical analysis SPSS 13.0 was used.
- The main fields of data collection for each surgical procedure were:
 - ♦ Pain medication
 - ♦ Cost of complications
 - ♦ Patient demographics
 - ♦ Estimation of staff time dedicated to POPM
 - ♦ Duration and administration of pain medication
 - ♦ Medical resource utilization for each sequence of POPM

- Data derived from four European Delphi panel meetings was also used in the model¹.

- ♦ The European Delphi panel meetings investigated time-related elements for intravenous patient-controlled analgesia (IV PCA) vs fentanyl iontophoretic system (ITS) in France, Germany, Scandinavia (Denmark and Sweden), and the UK/Ireland.

- ♦ The panellists were 36 nurses and 14 anaesthesiologists, who had previous experience with IV-PCA and who participated in a fentanyl ITS clinical trial. They provided the estimated time for each task that comprised 6 different categories that encompassed the entire course of therapy.

CONCLUSION

The treatment pathway starting with ITS was found to be the dominant treatment pathway in Greece indicating that the higher cost resulting from the ITS technology is offset by savings resulting from reduced staff time and fewer complications.

References : 1. Bonnet F, Eberhart L, Wennberg E, Maciver C, Dodds SJ, Choe Y. The perspective of healthcare staff on aspects of post-operative pain management with the fentanyl HCl iontophoretic system (ITS) or morphine intravenous patient-controlled analgesia (IV PCA): results from Delphi panels. ESA, 2006.

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- The validity of the estimates was confirmed using the method of Delphi Panel. The panel consisted of 40 surgeons and anaesthesiologists coming from 8 public hospitals located in Attica. The unit cost data were collected from 5 public hospitals in Athens and published literature, in 2007 (Table 2). The cost of the complications was based on estimations of the Greek Delphi panel (Table 3). Costs included pain medication and cost of POPM-related complications not covered by or exceeding the daily reimbursed amount to the hospital. The hotel costs, hourly salaries for health care professionals and the cost of complications were also included.

- Sensitivity analysis using a 30% variation was conducted for the cost of complications and staff time estimations.

Table 1. The most frequently used treatment sequences for post-operative pain in Greece

IV treatment sequence	Days	IM treatment sequence	Days	Epidural treatment sequence	Days
IV opioid administration		2 IM opioid administration		2 Epidural	2
IV non-opioid administration		2 IV non-opioid administration		2 Oral non-opioid administration	3
Oral non-opioid administration		1 Oral non-opioid administration		1	

Table 2. Unit costs (In €)

Unit	Unit cost
Hospital staff (per hour)	6.8
Anesthesiologist (per hour)	14.8
Pharmacologist (per hour)	9.9
Biomedical (per hour)	8.35
Hospital stay (per day)	117.4

Table 3. The cost of complications associated with invasive techniques of analgesia in Greece

Complication category	Cost(€)
Catheter-related infection	1575
Complications due to immobility: PGID	4829
Complications due to immobility: DVT/PE	5929
Complications due to coagulant treatment	3675
Opioid related AE: Respiratory depression	3080
Opioid related AE: Urinary Retention	2583
Opioid related AE: Urinary tract infection	1443

RESULTS

- Successful treatment was defined as the adequate control of pain and no complications. According to this definition the probability of success for each of the therapeutic options was 76% for ITS, 49% for the first two treatments and 72% for the third. The total cost of each treatment per patient was 677€-717€ for ITS and 717€, 704€ and 770€ for the three treatment sequences respectively. (Table 4)

- In the sensitivity analysis conducted the model was proved to be robust with low-moderate sensitivity.

Table 4. Cost and effect of the alternatives

Treatment sequence	Probability of success (effectiveness)	Total cost per patient (In €)	Difference in effectiveness compared to ITS sequence	Difference in cost compared to ITS sequence
IV treatment sequence	49%	717	27%	-40 to 0
IM treatment sequence	49%	704	27%	-27 to -13
Epidural treatment sequence	72%	770	4%	-93 to -53
ITS treatment sequence	76%	677 to 717		