Analysis of the cost-consumption of anaesthetic drugs & consumables in Mater Dei Hospital

Dr Stephen C Sciberras, Dr Petramay Attard Cortis
Department of Anaesthesia and Intensive Care, Mater Dei Hospital, Malta

Malta Medical School Conference 2012

Introduction

Anaesthetists use a number of expensive drugs, but we rarely really think about financial implications. However, drug wastage can and should be reduced.

We sought to investigate the expenditure for drugs and disposable equipment routinely used for anaesthetic purposes in Main Operating Theatre and Central Delivery Suite.

We hope that this will make the anaesthetist more aware of the costs involved in some choices, and hopefully reduce wastage.

Data Gathering

- Central Pharmacy were asked to provide the number of orders made by the Main Operating Theatres and Central Delivery Suite for a number of anaesthetic related medication, for the period from January 2012 to June 2012. The prices of these medications were also obtained.
- The same was done with a number of consumables, with data being provided by the Logistics section.
- The total number of procedures for the same period was obtained from the Clinical Performance unit.
- In order to have a reference, we also checked the same information for Prolene 3/0, a commonly used cheap surgical item.

Notes

- The cost of reusable equipment was not calculated, as this depends on a number of factors.
- The number of procedures nuclides local anaesthetics and endoscopy, as drugs and equipment are ordered by the Anaesthesia Cost Centre, even if the procedure would not involve an anaesthetist.
- The analysis was done on number of orders, not on actual consumption. This means that
  - it does NOT include consumption of previous stock
  - it does NOT compensate for drug or equipment shortages
  - it DOES include replacement of expired drugs, breakages
- In order to have a reference, we also checked the same information for Prolene 3/0, a commonly used cheap surgical item.

Limitations

- We cannot stress enough that this is not a cost-analysis of the anaesthetic services.
- This would have to be more comprehensive and include costs of re-usables and of man-power, both of which are notoriously difficult to price.
- Although the time frame is considerable, it might not be sufficient to analyse less-frequently ordered items. It also does not look into expired stock.

However, in an indirect manner, it reflects the costs of running an anaesthesia service, as after all, all orders from the Central Pharmacy Department bear a cost on the Hospital budget.

Acknowledgements

We appreciate the help of the Central Procurement Unit, the Central Pharmacy, the Main Operating Theatres and Central Delivery Suite for their collaboration in data col- lection.

No conflict of interests are declared.

Item	Number of orders	Unit price	Tot Cost
Prolene 3/0	3,396	€1.85	€6,272.41
Sevoflurane	762	€136.60	€104,089.20
Intravenous Fluid	50,117	€1.00	€50,321.38
Propofol 10mg/ml 20ml	13,460	€1.94	€26,112.40
Atracurium 25mg	11,490	€1.72	€19,762.80
Paracetamol 1g IV	6,218	€2.78	€17,286.04
IV cannulae	22,453	€0.76	€17,133.57
Phenylephrine 10mg/ml	1,440	€9.68	€13,939.20
Central venous catheters	530	€21.51	€11,400.30
Propofol Prefilled - Tci Pump	730	€13.88	€10,132.40
Armoured ETT	700	€13.72	€9,603.26
Dexamethasone 8mg	5,152	€1.86	€9,582.72
Isoflurane	306	€28.35	€8,675.10
Epidural packs	1,000	€7.49	€7,490.00
Bupivacaine 0.5%, 10mls	8,155	€0.84	€6,850.20
Ondansetron 8mg	660	€10.28	€6,784.80
Ephedrine 30mg	4,495	€1.43	€6,427.85
Lidocaine 2% In 5mls	11,587	€0.52	€6,025.24
Remifentanil 1mg	875	€6.75	€5,906.25
Mivacurium 2mg/ml	1,130	€4.63	€5,231.90
Morphine 10mg	10,770	€0.48	€5,169.60
Flumazenil 0.5mg	201	€23.00	€4,623.00
Doxapram 100mg	1,220	€3.63	€4,428.60
Atropine 600mcg	11,969	€0.35	€4,231.04
ETT , cuffed or plain	3,614	€1.15	€4,172.00
Fentanyl 100mcg	11,660	€0.34	€4,014.54
Ondansetron 4mg	770	€4.65	€3,580.50
Suxamethonium 100mg	3,587	€0.97	€3,479.39
Bupivacaine Heavy 0.5%	965	€3.51	€3,385.70
Adrenaline 1:10000 IV	980	€3.29	€3,224.20
Neostigmine 2.5mg	3,870	€0.82	€3,173.40
Arterial Cannulae	1,170	€2.67	€3,123.90
Tranexamic 500mg	1,230	€2.39	€2,939.70
Vecuronium 10mg	465	€6.27	€2,915.55
Midazolam 10mg/5ml	2,340	€1.13	€2,644.20
Glycopyrolate 600mcg	1,594	€1.57	€2,502.58
Spinal Needles, pencil point	1,000	€2.43	€2,429.50
RAE endotracheal tubes	898	€2.49	€2,234.65
Rocuronium 50mg	530	€3.92	€2,077.60
Thiopental 0.5mg	534	€3.88	€2,071.23
HiLo ETT	1,409	€1.35	€1,896.63
Desflurane	18	€98.53	€1,773.54
Prochlorperazine 12.5mg	1,910	€0.69	€1,317.90
Pancuronium 4mg/2ml	990	€1.28	€1,267.20
Diamorphine 5mg	510	€2.48	€1,264.39
Bupivacaine w`Adrena 0.5%	420	€2.57	€1,081.29
Diclofenac 75mg Injection	3,280	€0.32	€1,049.60
Spinal Needles, sharp bevel	729	€1.37	€998.73
Bupivacaine 0.25%, 20mls	560	€1.52	€851.20
Lidocaine 1%	1,540	€0.49	€746.90
Etomidate 20mg	374	€1.80	€673.20
Pethidine 50mg	1,700	€0.34	€578.00
Lidocaine 1% w' Adrenaline	260	€2.22	€577.15
Alfentanyl 1,000mcg	570	€0.93	€530.10
Ketamine 50mg/ml X 10ml	68	€7.35	€499.80
Sufentanil 250mcg/5ml	25	€17.37	€434.15
Noradrenaline 1:1000	170	€2.31	€392.58
Diclofenac 100mg Supps	2,370	€0.14	€331.80
Na Bicarbonate 10mmol	62	€2.68	€166.16
Sufentanil 15mcg	60	€1.72	€103.48
Paracetamol 500mg Tablets	9,424	€0.01	€94.24
Diclofenac 25 mg Tablets	1,300	€0.01	€13.00

	MOT	CDS
total drugs	€338,795.09	€26,538.89
total disposable equipment	€50,026.45	€7,332.76
total costs (exc prolene)	€388,821.54	€33,871.65
procedures	22,005	625 (excluding epidurals)

Results, Discussion

Comparison: Prolene 3/0 was chosen as a surgical, cheap item, since it is used often enough to be considered a standard surgical item.

Only sixteen anaesthetic items cost more than Prolene 3/0 in theatres, and this includes also intravenous fluids and intravenous cannulae. In fact, it costs more than the use of Remifentanil, Mivacurium, and Desflurane, all of which are expensive items in themselves. Hence, it can be concluded that the cost of anaesthetic services compares favourable to other areas.

Sevoflurane: An equipotent amount of Sevoflurane (762 bottles, MAC: 2%) and Isoflurane (306 bottles, MAC: 1.12%) were ordered. If Isoflurane would have replaced Sevoflurane, the difference in costs would amount to

€104,089.20 - (€8,675.10 x 2) = **€86,739**

Sevoflurane provides clinical advantages over other anaesthetic agents and cannot be discontinued. However, a more **judicious** use of Sevoflurane should be encouraged, with an emphasis on low-flow anaesthesia. For instance:

Sevoflurane

an inspired concentration of 2.4% achieved by:

3% at 3L/min	4.6% at 1L/min
29 ml/hr	14.8 ml/hr
€15.85 per hour	***€8.10*** per hour

Isoflurane

an inspired concentration of 1.6% achieved by:

2% at 4L/min	3% at 1L/min
24 ml/hr	9 ml/hr
€2.73 per hour	***€1.02*** per hour

For comparison, for propofol at maintenance rate of 40ml/hr (typical), the cost would be €3.88 per hour.

Propofol: Prefilled syringes are more expensive than generic propofol. However, prefilled syringe help in theatres were a number of infusions have to be constantly prepared, eg in cardiothoracics.

Ketamine: is particularly expensive (€7.35), but the preparation (500mg) contains a large dose. Typically usage nowadays is for 25mg – 50mg for an analgesic effect, so obtaining smaller preparations may be more cost-effective.

Fluid: Gelafundin is the most expensive fluid (€4.18, at €0.0084 per ml), but it pales in significance for the 50ml preparation of 0.9% Saline (€1.25, at € 0.025 per ml). ***This preparation was the 3rd highest expense related to fluids***.

If the same amount of packs (not volume) of the 100ml preparation, or even the 500ml preparation, were to be used, it would still be cheaper:

2,750units of 50ml preparation at €1.25: €3,437.50

- ditto - of 100ml preparation at €0.68: €1,870.00

- ditto - of 500ml preparation at €0.86: €2,365.00

Paracetamol: More is spent on intravenous paracetamol than on Isoflurane. Even if half the paracetamol and diclofenac were to be given orally (3,000 and 1,500 administration respectively), this would amount to a savings of €12,750.

Ondansetron, the 8mg preparation is of course more expensive than the 4mg, but at more than double the cost. It is more worth using two 4mg ampoules than one 8mg ampoule.

Phenylephrine: It is surprising how much is being prepared in routine cases besides CDS and cardiothoracics. For instance, there were 175 major cases in cardiothoracic cases in six months, and nearly 1,200 ampoules of phenylephrine ordered in the same period. This amounted to a cost of €11,519.20, which means that it is the seventh highest cost for the period investigated. As a comparison, one noradrenaline ampoule would cost €2.31 and one ampoule of phenylephrine would cost €9.68.

Doxapram and Flumazenil: At a cost of €4,356 and €4,623 respectively, this is expensive, when neither is not expected to be used in anaesthetic practice, especially Flumazenil which is extremely expensive, at €23 per vial. It is possible that most of the cost is not for actual consumption, but for replacing expired stock. It is well-known that theatre supplies include more than one vial, even 15 in one theatre, so this is clearly an area were particular savings could be made. One solution would be to have a list of drugs and equipment that should be stocked in theatre, to avoid over-stocking of items and consequent wastage.

General: The number of variants of the same item is considerable, although often justified in practice, eg endotracheal tubes and iv cannulae.

It might be better to group orders together, as a better price might be obtained, and all items would be from the same manufacturer, aiding the practitioner in using the product. This would benefit ETT, epidural sets, iv cannulae besides others.