ผลการศึกษาการรับรู้ราคาอุปกรณ์และยาในบุคลากรทางวิสัญญี

Cost awareness of consumables and medications used by anesthesia staff

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บทคัดย่อ

ค่าใช้จ่ายทางการแพทย์ในประเทศไทยส่วนหนึ่งเกิดจากค่ายาและเวชภัณฑ์ซึ่งต้องนำเข้าจากต่างประเทศเป็นส่วนใหญ่ ส่วนค่าจ้างหรือค่าแรงคิดเป็นสัดส่วนที่ต่ำกว่าในประเทศตะวันตกที่ค่าแรงสูง วิสัญญีแพทย์หรือวิสัญญีพยาบาลรวมทั้งแพทย์ประจำบ้านอาจจะไม่รู้ราคาของยาและเวชภัณฑ์ที่ตนเองใช้

วัตถุประสงค์การศึกษานี้เป็นการสังเกตการณ์ไปข้างหน้าในภาควิชาวิสัญญีวิทยาร.พ.ศิริราชทำการศึกษาระหว่างปี พ.ศ.2551 ถึง 2552 โดยมีการออกแบบสอบถามบุคลากรในหน่วยงานทั้งสิ้น 136 คนประกอบด้วยวิสัญญีแพทย์วิสัญญีพยาบาล และแพทย์ประจำบ้านโดยถามถึงราคาอุปกรณ์และยาทางวิสัญญีที่สุ่มตัวอย่างมา ถามทัศนคติหรือความเห็นถึงเรื่องผลของการรับรู้ค่ายาและเวชภัณฑ์ต่อพฤติกรรมการใช้ หลังจากนั้นคณะผู้ทำการศึกษาทำการติดป้ายราคายาและเวชภัณฑ์ให้ผู้ใช้สามารถเห็นได้ชัดเจนโดยไม่เบียดบังข้อความหรือฉลากยาหรือเวชภัณฑ์และอยู่ในตำแหน่งที่ผู้ใช้สามารถเห็นได้ง่ายเป็นเวลา 1 ปี หลังจากนั้นจึงออกแบบสอบถามเดิมถามเรื่องราคายาและเวชภัณฑ์อีกครั้ง นอกจากนี้ยังเก็บสถิติของจำนวนยาและเวชภัณฑ์ในสต็อคและติดตามผลการเปลี่ยนแปลงโดยใช้การวิเคราะห์ตามเวลาเป็นระยะๆ

ผลการศึกษาพบว่า บุคลากรในหน่วยงานมีความรับรู้ในเรื่องราคายาและเวชภัณฑ์ดีขึ้นเพียง 3 รายการจากตัวอย่างที่สุ่มถามทั้งสิ้น 25 รายการ โดยการเปลี่ยนแปลงดังกล่าวสังเกตเห็นได้เฉพาะในกลุ่มวิสัญญีแพทย์และพยาบาล ไม่พบการเปลี่ยนแปลงพฤติกรรมการใช้ยาหรือเวชภัณฑ์เมื่อเปรียบเทียบระยะก่อนและหลังการติดป้ายราคายา

สรุปการเพิ่มการรับรู้ราคายาและเวชภัณฑ์ทางวิสัญญีโดยวิธีการติดป้ายแสดงราคาได้ผลจำกัดเป็นบางรายการและทำได้เฉพาะในกลุ่มที่ไม่ใช่ผู้ฝึกหัด การปิดป้ายราคายาและเวชภัณฑ์ในภาควิชาวิสัญญีวิทยารพ.ศิริราชไม่ส่งผลให้เกิดการเปลี่ยนแปลงพฤติกรรมการใช้

คำสำคัญ : การรับรู้ค่าใช้จ่าย ป้ายราคา ลดค่าใช้จ่าย พนักงานการดมยาสลบ พฤติกรรมการใช้งาน การวิเคราะห์ต้นทุน ป้ายราคา

Abstract

Background : Labor costs in developing countries are less substantial when compared to costs related to imported pharmaceuticals and consumables. Locally manufactured high quality products are now also increasingly available in many Asian countries and less expensive. Many healthcare providers are not aware of actual costs of what they use daily.

Objective : to learn whether cost awareness can affect usage behavior and result in health care cost reduction.

Methods : A single center, prospective observational study conducted between 2008 and 2009. The pre-study questionnaire was issued to 136 participants (anesthesiologists, nurse anesthetists and anesthesiology residents) to assess their cost awareness of anesthesia consumables and pharmaceuticals. Price tags were then affixed on each medication and consumable, which could be clearly seen in daily practice. This was continued for 12 months. At the end of one year, a post-study questionnaire was issued to 125 participants. The stock data of used item was also recorded using time series analysis.

Results : Post study test data revealed improvement of cost awareness in only 3 out of a total of 25 sample items studied among anesthesiology staff but not among trainees (residents). Data showed no statistically significant changes (no reduction and no increment) between with and without intervention.

Conclusions : Cost awareness of anesthesia consumables and medications among certain group of anesthesia staffs (non-trainees) does not change usage behavior which resulted in no change of total anesthesia cost.

Keywords : cost awareness, price tag, cost reduction, anesthesia staff, usage behavior, cost analysis, price label

Introduction

Medical expenses are a major cost worldwide challenging economies and living standard in fully developed and less prosperous countries[1,2]. There are numerous studies in the health care sector which aimed at developing new technologies, new drugs and new guidelines i.e. promoting shorter acting agents which could expedite the recovery process, thus decreasing costs due to longer utilization of hospital beds and staff time.[3-9]

This study primarily focused on cost of medications and anesthesia consumables. Siriraj Hospital is the nations' largest anesthesia-training center with the department comprising of approximately 85 attending anesthesiologists, 72 post-MD residents, 64 nurse anesthetists and 35 nurse anesthetist students. The annual cases load averages at 40,000-45,000 patients, ranging from simple ambulatory procedures to major surgeries i.e. open heart surgery, organ transplantation and neurosurgery.

Pharmaceuticals and anesthesia consumables largely contribute to the final anesthesia bill paid by patients, insurance companies or the government. Contrary to industrial countries, professional staff salaries play a lesser role in Thailand compared to medications and expendable[2].

Previous studies indicated that medical professional staff are not fully aware of the cost of consumables[10,11]. We do not have answers whether anesthesia staffs at Siriraj Hospital know the cost of medications and equipments which they used daily. If they are aware of such costs, would they include this information in their clinical decision making. Many of the items have less expensive alternative products shown to be safe and effective, using such alternatives can often significantly and without any risk or disadvantage, reduce the cost to patients, insurers or the public treasury[11,12].

Method

The research proposal was reviewed by department research committee. The faculty ethic committee proposal was waived due to research design which does not involve in patient's data collection.Two identical questionnaires were issued at pre- and post-study. The questionnaires collected basic demographic data of participants which included their professional status (staff, residents). Nurse anesthetist students were excluded because of their short duration of training (1 year). The questionnaire also challenges participants to input the cost of 25 items sampled from commonly used anesthesia medications and consumables. Many of these items have alternatives that may be more or less expensive.

After the collection of pre-study questionnaires, we applied price tags to each medication and anesthesia expandable where it could be easily seen without obscuring any label carrying important information concerning the device or drug. If items were small, with large daily consumption i.e. small syringes or

needles, the price tags were affixed to the container where they could be easily seen.

The price tags were affixed for 12 months. During this period, the stock data were assessed periodically every 3 months to observe any changes in their use. When there were no changes, the intervention was continued for the full 12 months. Data collection was completed at this interval and at 18 month period (6 months following discontinuation of price tag application). The total annual cases were also recorded and adjusted to the annual cost.

Statistical analysis

The demographis of participants (shown in percentages) and the content of completed questionaires were compared between pre-intervention and post-intervention using Pearson Chi-square test. Cost estimations are shown as median ranging as a percentage of the actual cost, i.e. 0.00 = correct estimation, whereas 1.00 = 100% above the actual cost by using the Mann-Whitney U test. Finally, the changes in the amount of drugs and medical devices, as well as the total cases are demonstrated as mean (SD) which are compared between 3 periods (pre-, during and post- intervention). A p–value less than 0.05 is considered significant.

Table 1: The 23 items listed in the questionnaire

Items	Cost (Bht)
Desflurane bottle 240 ml	6,991
Isoflurane bottle 250 ml	3,580
0.5% Bupivacaine 20 ml amp	156
0.5% Hyperbaric Bupivacaine 4 ml	150
Voluven™ 500 ml bag	450
Tracheal tube, cuffed(Portex™)	113
Bronchocath™ DLT 37 Fr	2,580
Spiral tracheal tube (cuff) no 8.0	539
Whitacre 25G Spinal needle	118
Epidural (new) Perican® 17G	121
Jelco IV cath	22
Terumo IV cath 18 Ga	15
Nipro® needle	1
Terumo syringe 20 ml	6
Terumo syringe 1 ml	4
IV set	9
Infusion Terumo set	88
36 –inch extension tube	6
1200 cm extension tube	41
Onetouchdextrostrip	22.52
Bacterial filter	59

Results

The demographic data of all participants are shown in table 2. There was no significant difference between responders in the pre-intervention (n=136) and post-intervention group (n=125), sex, age and experience in anesthesia work.

Table 2: Demographic characteristic of participants, n (÷)

	Pre-intervention	Post-intervention	P-value
Participants (n=228)	136 (52.1)	125 (47.9)	0.785
Status			
- Nurses	41 (30.2)	38 (30.4)	0.905
- Attendings	49 (36.0)	42 (33.6)	0.894
- Residents	46 (33.8)	45 (36.0)	0.912
Sex			
- Female	113 (83.1)	107 (85.6)	0.577
- Male	23 (16.9)	18 (14.4)	0.585
Age			
- <30 yr	54 (41.6)	46 (37.1)	0.686
- 30-45yr	38 (29.2)	42 (33.9)	0.602
- >45yr	38 (29.2)	36 (29.0)	0.788
Experience			
- < 5yr	65 (48.5)	56 (45.2)	0.325
- 5-10yr	15 (11.2)	22 (17.7)	0.225
- >10yr	54 (40.3)	46 (37.1)	0.438

Figure 1 Cost estimation outcome compared between pre- and post intervention. Median cost estimate shown as multiply of actual cost where 1 = absolute correct estimation.

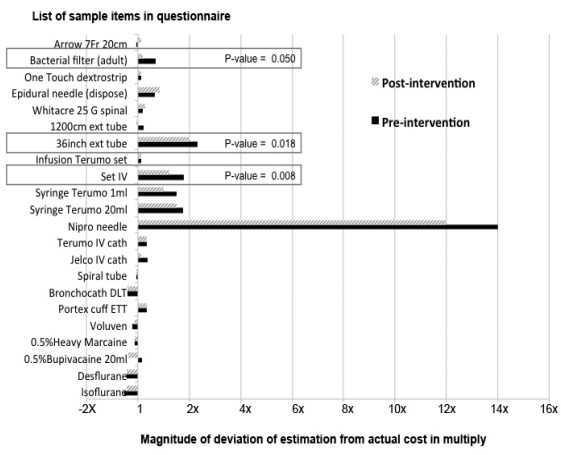

Table 3 : Cost estimations and questions answered by participants, n (÷)

Questions or items for cost estimation	Pre-intervention	Post-intervention	P-Value
1) You think knowing the cost is important			
Not necessary	12 (9.0)	15 (12.0)	0.423
Yes	122 (91.0)	110 (88.0)	
2) Knowing the price (How many items that you think you know the exact price – percentage of total item available ?)			
> 90%	4 (3.0)	1 (0.8)	0.012
> 50%	14 (10.4)	29 (23.2)	
< 25%	116 (86.6)	95 (76.0)	
3) Effect to the patient's outcome (Do you think that knowing each item's price will guide you to care patient better and thus improve patient's outcomes?)			
- no effect	28 (20.9)	33 (26.4)	0.355
- better outcome	101 (75.4)	89 (71.2)	
- adverse effect	5(3.7)	2 (1.6)	
4) Total cost reduction (Do you agree that staff awareness of medical consumables will help with total cost reduction without adverse effects on patient's outcomes?)			
- disagree	18 (13.2)	8 (6.4)	0.065
- agree	118 (86.8)	117 (93.6)	

The cost estimation from participants from both pre- and post- intervention and other questions are shown in figure 1 and table 3. The cost estimation is shown as median (range) as percentage of the actual cost. After price tag affixation, there are 3 items (from 25 sample items), which show improvement of cost awareness. Those are an IV set, 36-inch IV

extension tubing set and the bacterial filter for anesthetic circuit (see table 4), however this is not with normal distribution, hence the number in table are displayed as median. Overall, there are no statistically significant changes for cost awareness among all participants. However, in the nurse anesthetist subgroup, there is a significant improvement of cost awareness (P=0.048).

Table 4: The cost estimation part in the questionnaire – number represents percentage of true cost

Item	Actual price (Baht)	Total		
		Pre (n=136) median (range)	Post (n=125) median (range)	P-value
IV set	9	1.78 (-0.33 to 10.11)	1.22 (-0.67 to 15.67)	0.008
36 inch ext tube	6	2.33 (-0.17 to 32.33)	2.00 (-0.50 to 59.00)	0.018
Bacterial filter (adult)	59	0.69 (-0.75 to 4.08)	0.19 (-0.92 to 15.95)	0.050

The stock data are shown in table 5. The time interval assessment (time series analysis) is 6 months, which are for beforeprice tags, during price tags and post-price tags intervention. There are no statistically significant differences in usage of any medical devices between each period, but there are changes noted in medication group. These changes include an increased usage of propofol (20 ml ampule), morphine sulfate (10 mg/ml ampule), pethidine or meperidine (50 mg/ml ampule), parecoxib IV (40 mg vial) and cis-atracurium, while the usage of fentanyl (100 micrograms/2 ml ampule) decreased.

Table 5 : Stock data changes (number display is quantity used per month adjusted with total cases in the period of study)

Drug	Pre-intervention Mean (SD)	Between-intervention Mean (SD)	Post-intervention Mean (SD)
Propofol (20ml/amp)	1138.82 (78.24)	1175.94 (86.98)	996.90 (72.29)
Propofol (50ml/vial)	109.67 (17.85)	218.79 (19.84)	275.38 (16.49)
Fentanyl (2ml/amp)	1953.61 (135.64)	2264.16 (150.78)	1070.57 (125.33)
Morphine	950.69 (62.58)	918.55 (69.57)	1194.93 (57.82)
Pethidine	228.63 (56.15)	295.26 (62.42)	666.11 (51.88)
Parecoxib	50.91 (11.36)	95.01 (12.63)	111.42 (10.50)
Cisatracurium	228.87 (26.75)	349.73 (29.74)	375.24 (24.72)

Table 6: The number of patients receiving anesthesia service

Study	Period	Mean	SD	P-value
Pre-intervention	Jan 08 – Jun 08	3540.50	94.712	0.011
Between-intervention	Jul 08 – Dec 08	3838.33	164.955	
Post-intervention	Jan 09 – Jun 09	3601.33	188.848	

Since the intervention took an entire year, adjustment between each year based on number of patients receiving anesthesia was mandatory. There were differences in the number of patients between 2008 and 2009. The stock data were weighted accordingly.

Discussion

There are limited data from the previous literature of how cost awareness can influence behavior of anesthesia staff[11, 12]. Applying price tags is one of the many methods to inform concerning cost of medications and consumables anesthesia personnel constantly and gradually.

The pattern of cost estimation in our institution is similar to a previous study[10], in which, there is underestimation of relatively high cost medications or devices and overestimation of the lower cost items i.e. syringes or needlesas shown in figure 1 where the needle (Nipro®) was overestimated at 14 times of the actual cost. Cost under-estimation has been shown to be the major cause of increased medical expense[14].

The pre- and post- questionnaire does not show significant improvement of cost awareness among all participants across all listed sample items on the questionnaire. The possible explanation includes:- inadequate price tag application, lack of observation and ignorance of individual participants. Even significant cost-awareness improvement was noticed among the nurse anesthetist subgroup but there was still no correlation between specific items which show improvements (an IV set, a 36-inch extension tubing set and a bacterial filter) and their usage. The most logical explanation is there are no alternatives to these 3 individual items and they must be used in routine practice i.e. bacterial filter is needed to be attached to the anesthesia circuit for individual patient. The user cannot thus opt not to use one, and knowing the price will not alter usage.

For the medications group, the changes (increased usage for Propofol, Cis-atracurium, Morphine, Pethidine, Parecoxib and decreased usage of Fentanyl) do not correlate with cost awareness of each item. Some of the changes were influenced by a national Fentanyl shortage which occurred during our study. This resulted in decreased Fentanyl usage and increased usage of other narcotics (Morphine, Pethidine) and IV COX-2 NSAID inhibitor; Parecoxib. For Propofol and Cis-atracurium, increased usage cannot be logically explained

by our intervention, the observed changes are probably due to increased popularity

Cost awareness can be partially improved by price tag applications. The process is time consuming and incurs additional labor costs associated with the manual price tag affixation. Such cost awareness was significantly witnessed only among nurse anesthetists at our institution and is unfortunate as they represent only a smaller group of our staffs. Moreover, the treatment decision making is mostly made by physicians, hence the actual effect on cost reduction may be less substantial.

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