Reports of Investigation

A "zero tolerance for overtime" increases surgical per case costs

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Purpose: One technique which some hospitals have used in an attempt to control Operating Room costs is a "zero tolerance for overtime" policy. We used a case cost analysis to determine if this policy was always cost effective.

Method: A case cost analysis was designed based on a "test case" which would start late in the day. The case would last for three hours of which 1 ½ hr would be during regular hours, and 1 ½ hr would incur overtime. Costs were analysed using a "patient pays," "society pays," and "hospital pays" analysis. Costs were based on figures determined from the SMBD-Jewish General Hospital budget, Québec Health Insurance fees, and Government of Canada statistics.

Results: Regardless of who pays, in this case scenario it was more cost effective to proceed than to postpone surgery. Costs of proceeding with the surgery in the "patient pays," "society pays," and "hospital pays" models were $1,832.00, $1,227.40, and $1,215.00 respectively. The costs of postponing the surgery in the same three models were $1,937.00, $1,336.80, and $1,436.00.

Conclusion: A "zero tolerance for overtime" policy may be too rigid to be consistently cost effective.

Objectif : À la salle d'opération, certains hôpitaux appliquent la règle de la tolérance zéro vis-à-vis le temps supplémentaire dans le but de diminuer les coûts. Nous avons analysé les frais d'une intervention pour déterminer si cette politique était toujours efficace par rapport au coût.

Méthodes : Une analyse des frais occasionnés par une intervention a été élaborée autour d'une intervention type qui commencerait tard dans la journée. Elle durerait au moins trois heures dont la moitié pendant les heures régulières et l'autre en dehors de celles-ci. Une analyse basée sur la source du paiement, patient, collectivité, hôpital, a servi à déterminer les coûts. Les valeurs utilisées provenaient des chiffres fournis par l'Hôpital Juif SMBD de Montréal, les honoraires de la Régie d'Assurance Maladie du Québec et Statistiques Canada.

Résultats : Les coûts de l'intervention selon la source du paiement, patient, collectivité et hôpital, se chiffraient respectivement à 1,832,00$, 1,227,40$ et 1,215,00$. Basés sur ces mêmes modèles, les coûts du report de l'intervention s'élevaient à 1,937,00$, 1,336,80$ et 1,436,00$.

Conclusion : La règle de la tolérance zéro vis-à-vis le temps supplémentaire semble trop rigide pour garantir un bon rapport efficacité/coût.

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WITH growing pressure to limit health care spending,[1–4] hospital administrators have looked at overtime salary costs as a likely target for savings. With a "zero tolerance for overtime" policy in our hospital a dilemma has arisen. It can happen that a late afternoon case will not be started during elective hours, for fear of running into overtime costs. We present a cost accounting analysis to determine whether costs would be greater if surgery were performed late in the day than if it were postponed.

Methods

The SMBD-Jewish General Hospital is a tertiary care University teaching hospital. Each year the Operating Room serves approximately 6,500 in-patients and 9,500 out-patients using 17 operating rooms. A wide range of surgical specialties and sub-specialties is represented, with the exception of paediatric surgery.

The organization of nursing staff in the Operating Room provides for five rooms to continue after 15:30 hr. Should additional rooms run after 15:30, overtime salary expenses are incurred.

The analysis surrounds a "test case" anticipated to last for three hours. In this hypothetical situation at 14:00 hr a decision must be made whether to proceed with the case. Casual observation reveals that if it proceeds, 1½ hr of overtime salary expenses will be incurred, while cancellation may result in 1½ hr of unused operating time.

For the purposes of this analysis several assumptions were made:

1 This was an elective procedure performed after same-day admission which could have been postponed to a future date without harm to the health of the patient.

2 All other available Operating Rooms in the Institution were in use. No other case could be slotted in the Operating Room in question.

3 If the case were cancelled and rescheduled, the salaried OR personnel would perform "general duties" but would not be involved in direct patient care.

4 If the case were cancelled and rescheduled the "fee for service" medical specialists would not provide care to a different patient.

5 The OR administrator (at the SMBD-Jewish General Hospital this is the assistant Head nurse in the OR) projects that all late shift nurses will be occupied in other patient care at 15:30. If not, the "test case" would proceed, since no overtime costs would be incurred.

6 If the procedure were performed, salaried staff would be paid a 50% overtime premium.

7 Since many Canadian hospitals have adopted same day admission policies, if the procedure is rescheduled only the one working day spent by the patient while waiting for surgery would be included as loss of income.

8 The test case was originally scheduled at 12:30 hr. Technical difficulties in a previous case delayed the procedure in question thus precipitating the decision whether or not to proceed.

9 If surgery were postponed the patient would not stay in hospital and, therefore, the hospital bed was available to another patient. Consequently bed costs beyond the day of case cancellation were not charged to the patient in question.

10 The patient acquired no diseases while awaiting surgery. Furthermore, his post-operative recovery was identical in terms of investigations, support requirements, and post-operative hospital stay.

11 When the procedure was performed at the rescheduled time, no overtime salary costs were incurred. Medical specialist fees and pharmacy costs were considered to be equal whether the case proceeds or is rescheduled.

12 The waiting period before the rescheduled procedure was not added to the length of total hospitalization and convalescence. We assumed that the patient continued to work in the interim and then returned to work after the same postoperative recovery time regardless of when the surgery was performed.

13 Calculation of hourly OR costs is based upon total OR labour costs (including benefits) divided by the total hours of surgery at the SMBD-Jewish General Hospital in 1996. At the SMBD-Jewish General Hospital this resulted in hourly OR labour costs of $160.00. Non-physician anaesthesia labour costs were calculated by dividing the hours of surgery into labour costs (including benefits) for anaesthesia technicians. At the SMBD-Jewish General Hospital this resulted in hourly anaesthesia technician costs of $36.00. Operating Room supplies (sutures, gloves, antiseptic solution) used were assumed to be equivalent regardless of when the procedure was performed. The OR supply costs were calculated from the total

cost of supplies divided by the number of surgical procedures performed. Anaesthesia supplies costs were calculated from the total cost of anaesthesia supplies divided by the number of surgical procedures performed.

14 Professional fees were standard fees paid by the provincial health insurance plan (Régie de l'assurance-maladie du Québec). The average fees payable to one surgeon (no assistant) and one anaesthetist were compiled for the following "three hour long" surgeries – total knee replacement, anterior resection, reduction mammoplasty, nephrectomy, and femoral-popliteal artery bypass and graft. No after hour premiums were included. The average fee payable to one surgeon (no assistant) were compiled for the following "one and one-half hour" surgeries – arthroscopic lateral meniscectomy, inguinal herniorrhaphy, palmar fasciectomy, transurethral prostate resection, and stripping and ligation of varicose veins.

15 The cost of one surgical hospital bed is calculated from the hospital budget where total labour costs for a surgical bed were divided by the number of surgical bed days. Administrative labour costs were the hospital administrative costs divided by the total number of bed days. Technical, maintenance, security, pharmacy, radiology, laboratory, central supply room, and physiotherapy costs were the respective department budget costs divided by the total number of hospital bed days. No attempt was made to include fixed costs, such as capitalization of OR equipment, depreciation, or "return on equity" for funds already invested in hospital land and buildings.

16 All cost and salary figures were derived from the SMBD-Jewish General Hospital budget.

17 Average income statistics for the population were derived from Government of Canada statistics.[5]

18 Marginal tax rates for individuals were derived from the province of Québec and the Government of Canada taxation tables for the year 1996.[6] The value of a patient's lost income for one day was calculated using an average annual salary for men in Canada of $40,000 (and assuming a five-day work week and 50 wk of work per year), a $6,500.00 personal individual income tax deduction and a 40% marginal tax rate. The marginal tax rate used for hospital labour was 35% or 40% depending upon whether the calculated gross annual income was under or over $35,000. The marginal tax rate used for the professional fees was 52%.

Using the preceding assumptions we calculated the costs of performing the procedure on the original scheduled day, *vs* postponing the procedure, in three ways:

1 A "patient pays" model, (Table I) in which the patient pays all direct and indirect costs of his procedure. Only financial costs were used. No attempt was made to quantify patient satisfaction or inconvenience. The patient was not charged overtime costs because the need for overtime was the hospital's fault, not the patient's.

2 A "society pays" model (Table II), in which the financial costs of this decision are calculated for society as a whole. Again only financial costs were calculated, and no attempt was made to quantify patient satisfaction, or inconvenience to the patient, his family, or his employer. The assumption was made that the employer suffered no direct costs from the patient's absence in the event of postponement of the procedure. After tax values were used for labour costs because the taxed income returns to society.

3 The current Canadian hospital model (Table III) in which the provincial government acts as the third party payer. All hospital costs were paid out of a predetermined global budget with no reliance on "diagnosis related groupings" (DRGs). Medical specialists are paid fee-for-service by the health care system.

Results

An analysis of the various costs and savings for proceeding with the case and incurring overtime expenses *vs* postponing the case, in each of the three payment models, revealed that in each case it was more cost-effective to proceed.

In the "patient pays" model (Table I) the patient would pay $1,832.00 if the case proceeded and incurs overtime expenses *vs* $1,937.00 if it were postponed.

In the "society pays" model (Table II) the cost of proceeding was $1,227.40 *vs* $1,336.80.

In the "hospital pays" model (Table III) the cost of proceeding was $1,215.00 *vs* $1,436.00.

Hourly wages for hospital employees are listed in Table IV.

Discussion

Our results show that regardless of the source of payment, in the case scenario presented, it will be cost efficient to proceed with the case. The current Canadian system in which global budgets function as a "rigid box" may prevent the most efficient utiliza-

TABLE I Costs calculated in the patient pays model

	Proceed with case	*Postpone case*
OR Labour costs		
3.0 hr standard cost	480.00	480.00
Anaesthesia technician costs		
3.0 hr standard cost	108.00	108.00
OR supplies costs	70.00	70.00
Anaesthesia supplies costs	28.00	28.00
Professional fees	765.00	765.00
Hospital costs per surgical bed/day		
Labour	130.00	130.00
Supplies	8.00	8.00
Hospital costs per patient bed/day		
Administrative	20.00	20.00
Technical		
Laundry/Housekeeping	25.00	25.00
Maintenance		
Repairs and Labour	11.00	11.00
Security	3.00	3.00
Pharmacy	9.50	9.50
Radiology	20.00	20.00
Laboratory	30.00	30.00
Central Supply Room (CSR)	5.00	5.00
Physiotherapy	4.50	4.50
Post Anaesthesia Care Unit (PACU)		
Labour	110.00	110.00
Supplies	6.00	6.00
Lost income for one day (after tax)		105.00
TOTAL	1,832.00	1,937.00

TABLE II Costs calculated in the society pays model (after tax values)

	Proceed with case	*Postpone case*
OR Labour costs		
1.5 hr standard cost	160.00	
1.5 hr overtime cost	240.00	
3.0 hr standard cost		320.00
Anaesthesia technician costs		
1.5 hr standard cost	39.00	
1.5 hr overtime cost	59.00	
3.0 hr standard cost		78.00
OR supplies costs	70.00	70.00
Anaesthesia supplies costs	28.00	28.00
Professional fees	367.00	367.00
Hospital costs per surgical bed/day		
Labour	89.00	178.00
Supplies	8.00	16.00
Hospital costs per patient bed/day		
Administrative	13.50	27.00
Technical		
Laundry/Housekeeping	19.00	38.00
Maintenance		
Repairs and Labour	7.50	15.00
Security	2.10	4.20
Pharmacy	6.30	12.60
Radiology	13.50	27.00
Laboratory	20.00	40.00
Central Supply Room (CSR)	3.50	7.00
Physiotherapy	3.00	6.00
Post Anaesthesia Care Unit (PACU)		
Labour	73.00	146.00
Supplies	6.00	12.00
Lost income for one day		105.00
Professional fees saved		(160.00)
TOTAL	1,227.40	1,336.80

TABLE III Costs calculated in the hospital pays model

	Proceed with case	*Postpone case*
OR Labour costs		
1.5 hr standard cost	240.00	
1.5 hr overtime cost	360.00	
3.0 hr standard cost		480.00
Anaesthesia technician costs		
1.5 hr standard cost	54.00	
1.5 hr overtime cost	81.00	
3.0 hr standard cost		108.00
OR supplies costs	70.00	70.00
Anaesthesia supplies costs	28.00	28.00
Hospital costs per surgical bed/day		
Labour	130.00	260.00
Supplies	8.00	8.00
Hospital costs per patient bed/day		
Administrative	20.00	40.00
Technical		
Laundry/Housekeeping	25.00	50.00
Maintenance		
Repairs and Labour	11.00	22.00
Security	3.00	6.00
Pharmacy	9.50	19.00
Radiology	20.00	40.00
Laboratory	30.00	60.00
Central Supply Room (CSR)	5.00	10.00
Physiotherapy	4.50	9.00
Post Anaesthesia Care Unit (PACU)		
Labour	110.00	220.00
Supplies	6.00	6.00
TOTAL	1,215.00	1,436.00

tion of resources. A more flexible system could both increase productivity and lower expenditures as demonstrated by our case-cost analysis.

The analysis of a hypothetical event requires certain assumptions. Nevertheless, the "test case," one in which the trade-off is between incurring overtime expenses and leaving OR time "fallow" at the end of the day is very real in our institution. Wherever assumptions are made, care is taken to make them as conservative as possible. We avoided the additional costs that would have ensued from harming the patient through the delay, or to other patients from decreasing their access to care. As well, we made the very conservative assumption that, if the late day case is postponed, the patient will be discharged from hospital and readmitted for his surgery at a later date. This discounts the effect on cost of the still common practice of keeping patients in hospital for one or more days until their surgery can be performed.

We did not increase the cost of hospitalization by including "return on equity," that is opportunity cost of funds invested in hospital real estate, nor did we include depreciation of assets, or capitalization of Operating Room equipment in daily hospital costs.

TABLE IV Average hourly wages for SMBD-Jewish General Hospital employees from the SMBD-Jewish General Hospital global budget including benefits

Post Anaesthesia Care Unit Nurse	23.50
Operating Room Nurse	21.30
Surgical Ward Nurse	19.65
Anaesthesia Technician	19.00
Administration	22.65
Public Relations, Purchasing Telecommunications, Garbage Disposal Accounting, Human Resources	
Laundry/Housekeeping	13.25
Maintenance	17.60
Security	16.00
Pharmacy	22.65
Radiology	20.00
Laboratory	21.25
Central Supply Room (CSR)	15.50
Physiotherapy	24.85

Other factors not included in the per diem surgical bed cost are infrastructure costs of radiation oncology and our combined medical-surgical intensive care costs. While these services factored over all hospital beds and pro-rated for surgery would increase surgical bed cost, they do not change the direction of the results.

Medical supply costs were calculated from a global composite, in which the OR budget for medical supplies was divided by the number of patients served by the OR in one year. While the average figure we used includes higher cost cases (which last longer than our three hour test case) such as coronary artery bypass procedures, neurosurgical cases, or complex orthopaedic procedures, these are balanced by the large number of out-patient procedures.

As we see from the Results (Tables I–III) using our assumptions, it will always be cost-effective to proceed with the case, thus incurring a small amount of overtime. We were not surprised at the higher cost to both patient and society of postponement. In the "patient pays" (Table I) and "society pays" (Table II) models the higher costs due to postponement arise as a result of the additional costs of hospitalization, and losses related to lost patient income.

It is the hospital model which is perhaps the most interesting. If we ignore the cost of hospitalization, or remove costs common to either surgical timing scenario we are left with the fact that we must balance overtime costs on one hand, *vs* "downtime" on the other. However, if one assesses the situation as the administrator responsible for controlling the operating room budget we see that if:

G = global operating room budget

N = number of surgical procedures

S = Operating Room, Anaesthesia, and PACU supplies costs per case

H = hourly labour cost

then

$$\frac{G}{N} - \frac{G}{N+1} = \text{the fractional improvement in productivity}$$

and **G + S** = the dollar cost of proceeding with the case.

As pointed out in assumption #5, if no overtime costs were incurred, then the surgery would proceed and supplies costs would be absorbed. However, if overtime costs were incurred, the cost of the procedure (assuming a 1.5 × premium for overtime labour costs) becomes:

$$G + S + (H \times 1.5)$$

The added cost (H × 1.5) would increase overall costs to the operating room budget. Thus, despite the financial benefit to the patient, society, and the hospital of improved efficiency and productivity, the surgical procedure may not be performed because the operating room budget which is the limiting step in this process, has a financial disincentive to proceed.

Conclusion

In our case cost analysis, the cost of postponing a late day case is always greater than that of proceeding, regardless of whether the costs are absorbed by the patient, society, or the hospital.

We conclude that a "zero tolerance for overtime" policy may be too rigid to be consistently cost effective.

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