You want me to write a business plan? Capital budgeting fundamentals for the plastic surgeon

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As we enter the new era of medicine in which cost becomes as important as outcomes, clinicians struggling to treat patients frequently find themselves in uncharted territory. Gone are the days in which a new technology or treatment will be embraced by hospital administrators simply because a surgeon makes a cogent argument that it will raise the quality of care delivered at the institution. Administrators want to know how much the intervention will cost, whether it is revenue positive or, at the very least, revenue neutral, and what the long-term implications will be on the global budget. Think of administrators as investors: they want to know if there is value in the investment. The yearly process of allocating funds in the hospital falls under the umbrella of capital budgeting. Regardless of whether we agree with the direction of things, there is certain advantage to being able to 'talk the talk'. Understanding the calculations behind capital budgeting enables a clinician to do just that.

Imagine, if you will, a struggling telecommunications company. Money is tight. Shareholders are demanding; they want return on investment. All decisions must be considered in the context of their ability to generate revenue. Managers need money to invest in projects in their respective departments. The engineers want money for research and development, the marketing division wants money for promotion and the HR department wants money for new hires. The CEO must decide what investments are most likely to generate revenue moving forward. To attract investment, departmental managers make arguments using a universal business tool: the business plan. They typically base their business plan on one of two capital budgeting calculations: net present value (NPV) or the internal rate of return (IRR). The hospital is no different, with one exception: the goal is savings, not profit. Treatments change rapidly when evidence emerges favouring one modality over another. The rapid integration of BRAF inhibitors into the melanoma treatment armamentarium is a good example. Costly interventions will emerge that drain funds; money saved can be re-allocated, enabling programs to evolve with the dynamism of treatment.

A DOLLAR IS NOT WORTH A DOLLAR NEXT YEAR

A fundamental concept integral to business planning is the time value of money. A dollar today is worth more than a dollar in the future. If you invest a dollar today and get one back in return in one year, you have lost money. The Canada price index (CPI) is the calculated escalating value of goods each year. Currently, it is approximately 2%. In our investment scenario, in which $1 invested returns $1 per year later, it is also the value lost on the investment: in this case 2¢. Although we all understand the meaning of inflation based on the escalating cost of a carton of milk over time, we must appreciate how this factors into investment in the hospital administrator's world. Interest rates are directly tied to changes in inflation or the CPI. If inflation gets out of control, the government raises interest rates and stalls the economy. In fact, Canada was instrumental in developing and promoting a targeted inflation rate policy that is now commonplace worldwide. The point is that the value of a dollar erodes over time. Whatever money a project generates over time must take into account that the value of the dollar is falling.

THE HURDLE RATE

Companies want to earn a percentage back on the money they invest. The Hurdle rate is the minimal accepted return on investment that is required to get a project off the ground. Remember that a company's financial objective is to increase shareholder's value through profit. If a manager cannot prove that his proposed project will meet profit objectives by surpassing the company's Hurdle rate, the project must be reworked or is buried. The Hurdle rate accounts for three things: a predetermined minimally acceptable percentage profit that takes into account the falling value of the dollar over time; and the cost of the money required to get the project off the ground.

MONEY COSTS MONEY: THE COST OF CAPITAL

Corporations do not keep much cash on their books. Cash should be invested to increase returns and shareholder value. When companies need money, they borrow it. And they pay a fee to borrow that money. This is the cost of money, otherwise known as the cost of capital (COC). Your mortgage aptly illustrates the idea. Over time, you pay a percentage value of the principle to the bank that lent you the money to make the purchase. Most do not think of that rate as the COC, but it is in fact the cost of money borrowed to own your home. The profit realized at the sale of the house is the money left over after accounting for the deflated value of the dollar at the time of sale and the interest paid over time. Banks are acutely aware of the devaluing dollar. Your mortgage rate takes into account that over time you pay it down with dollars that are worth less than the dollars the bank gave you at the outset to buy your house. Right now, the COC at our hospital is approximately 3.5% to 5% for a five- to 10-year term (personal communication, J'Neene Hauck, CFO, Kingston General Hospital, Kingston, Ontario). Using the COC in our calculations saves us the complexity of accounting for CPI; it is already implicit in the COC.

If you want to propose a project at your hospital, the odds will be in your favour if you can prove it will save money over time or significantly improve quality at an acceptable cost. In a for-profit corporation, you need to prove the percentage returns or the IRR will surpass the company's hurdle rate; in a publically funded hospital, it is easier to calculate the NPV to justify your expenditure.

THE NPV OF MY PLAN

The NPV and the IRR are the twin sisters of capital budgeting. For both calculations a capital investment is only considered on the basis of its future revenue streams. Everything comes down to the money the project will consume or save each year. This means that the project becomes an annuity or a bond. If the project only consumes money, then it must quantifiably increase the quality of care – this becomes a tougher argument.

If you can prove the NPV is revenue positive or at least revenue neutral, you will have a leg up on the competition. You will have to chat with your CFO to get the calculations off the ground and you will have to crunch some numbers. You do not actually have to do much math at all. Any spreadsheet program will have a NPV tool – look in the financial functions. For this example, however, we are going to do the math long hand.

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AN ILLUSTRATIVE EXAMPLE... HOPEFULLY

When an administrator asks you to draft a business plan for the expenditure you have proposed it is no different than the CEO asking a manager to justify a project to prove its long-term profitability. At times the metrics get complicated – try putting a dollar value on quality – but at other times these calculations are easy.

Imagine someone invented a tool that would put a patient into mandibular maxillary fixation with a little setup and the touch of a button. If only such a machine existed. Save few, most plastic surgeons would leap at the opportunity to acquire said device. Of course new toys cost lots of money, but what if there was a way to prove that despite the expenditure it would actually save money? Enter the clinician-assembled business plan.

This magical machine puts the patient into MMF and uses a one-time use disposable cartridge, much like the general surgeons use when anastomosing bowel. The hospital would have to buy the machine and they would have to purchase the cartridges for each case. The machine has an estimated lifespan of 10 years, after which it ceases to function and has no value. We begin with our known variables:

Number of mandible fractures treated per year:	40
Time (min) required to put the patient into MMF:	45
The cost of the device:	$15,000
Cost of cartridges:	$1,000
Average time (min) required to deploy the cartridges:	15
Cost of capital:	5%
Allocated operating room costs/min:	$40.00/min

First we need to determine the money that goes out each year as a result of the purchase, as well as the money that comes in. In this case, the machine does not generate income but it saves time and, as the old adage goes, 'time is money'. Nowhere is that more true than in the operating room.

Time zero is when the machine is purchased. We will assume that all cartridges are purchased at the start of each year. After the initial investment, only cartridges are required.

Cash out time zero: 15,000 + (40 x 1000) = 55,000

Cash out thereafter: $40,000 per year in cartridges

Now lets examine the cash inflow or savings. Each year, the machine saves 30 min × 40 cases or 1200 min of operating room time. The operating room time is allocated at $40/min when you account for all costs. This means the device will shave $40/min × 1200 min = $48,000 per year off the operating room budget, less the cartridge purchase. Yes, for these detail-oriented folks that time will be immediately used for other things, not really saving the hospital money, but remember, savings can be reallocated extending the capability of the institution. Things are starting to look good. Here you want to think broad: you are trying to win an argument. We will leave this type of creativity to you, but as an example in this scenario it would be reasonable to include the cost savings realized through a decreased incidence of needlestick injuries and their workup.

Cash in per year, or savings: $48,000 − $40,000 = 8,000

The only thing we have to remember is that the $8,000 saved in the future is in future dollars, which are worth less than the dollars we use today to buy the device. We need to convert the future savings to present day dollars. To do so, we think of the cash inflows as an annuity.

An annuity is simply a stream of future cash flows. The value of a bond or an annuity is calculated using annuity tables. Banks use these tables to determine the cost of a bond purchased as an investment. Fortunately, these are easy to read and are readily available online (1). Remember, this is the long-hand version of the solution; Excel (Microsoft Corporation, USA) will do this for you automatically.

We look up the present value (PV) of an annuity that pays 5% — our institution's cost of capital. We are given multipliers that convert yearly cash flows into present day dollars. The lifespan of the project is broken down into its future cash flows and its NPV is calculated.

As long as the NPV is greater than zero, then the purchase is revenue positive. The NPV of future cash flows for this project is $6,773. The calculations demonstrate that an expensive piece of equipment with quite high per case operating costs is a money saver for the administration over the lifespan of the tool (Table 1).

TABLE 1
Net present value calculation of investment

Year	Cash flow	Present value at 12%	Total net present value
0	–55,000	1	–55,000
1	8,000	0.9524	7,619
2	8,000	0.907	7,256
3	8,000	0.8638	6,910
4	8,000	0.8227	6,582
5	8,000	0.7835	6,268
6	8,000	0.7462	5,970
7	8,000	0.7107	5,686
8	8,000	0.6768	5,414
9	8,000	0.6446	5,157
10	8,000	0.6139	4,911
			6,773

BUSINESS PLAN

Obviously, this is a simplified example, but it is not unrealistic. Presenting an administrator with a cost savings business plan over begging for another expensive purchase will carry weight. The calculations are the difficult part. Everything else is just writing. Do remember that a business plan is drastically different than an academic paper. Be brief, be concise, be clear, be less concerned with citing every sentence and be straight to the point. The Internet is full of advice on how to write your plan. If you need a reliable place to start, try the Government of Canada's small business site (2). Remember to exercise judgment tailoring these suggestions to our not-for-profit world of health care.

REFERENCES

1. <www.principlesofaccounting.com/ART/fv.pv.tables/pvofordinaryannuity.htm> (Accessed April 4, 2013).
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