Economics of Nuclear Medicine for the Technologist

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CANM annual scientific conference
I do not have a financial interest, arrangement or affiliation including receipt of honoraria or expenses with a commercial organization that may have a direct interest in the subject matter of my presentation.
Objectives

• Technologists will be able to identify inefficiencies in the operation of a nuclear medicine clinic
• Technologists will be able to consider a nuclear medicine schedule with business also in mind
Agenda

• Glossary
• Business 101
• Economic Challenges
• Facilities
• Staff Salaries
• Consumables
• Quality Control
• Radiopharmaceuticals
• Technical Fees
• Case Studies
• Summary
GLOSSARY
Glossary

• Economics
• Margin
• Median
• Working Days
• IHF
• OHIP
• Technical Fees
• Professional Fees
Glossary

• Economics
  – The theories, principles, and models that deal with how the market process works.
  – It attempts to explain how wealth is created and distributed in communities, how people allocate resources that are scarce and have many alternative uses, and other such matters that arise in dealing with human wants and their satisfaction.

Read more: http://www.businessdictionary.com/definition/economics.html

CRYSTAL CLEAR?
Glossary - Economics

When life gives you lemons, make lemonade!
Margin (Gross Profit Margin)

- **Gross profit margin** is a financial metric used to assess a company's financial health and business model by revealing the proportion of money left over from revenues after accounting for the cost of goods sold (COGS).

- **Gross profit margin**, also known as **gross margin**, is calculated by dividing **gross profit** by revenues. (www.Investopedia.com/terms)
Glossary – Gross Profit Margin

OUR NEW STRATEGY IS TO LOWER OUR PRICES TO INCREASE SALES.

SO OUR STRATEGY IS TO START A PRICE WAR AND DRIVE OUR PROFIT MARGIN TO ZERO?

IT MADE SENSE AT THE EXECUTIVE RETREAT. WAS ALCOHOL INVOLVED?
Glossary

• **Median**
  – The number in the middle of a set of numbers
  – If there is an even amount of numbers in the set, the median is the average of the two numbers in the middle
Glossary

- **Working Days (Ontario, Canada)**
  - Potential working days in a year
  - Working days = Days in a year – (weekend days + public holidays)
  - Working days in 2017 = 365 – (105 + 9)
  - Working days in 2017 = 253
  - Must also consider days technologist is available and efficiency of scheduling (e.g., would not keep a day on the schedule if only 1 test scheduled)
  - Equipment up time = 98%; 98% of 253 = 248

248
Glossary

• **IHF (Independent Health Facilities)**
  – Diagnostic facilities that are funded by the Ministry to provide specific classes of patient testing (e.g., diagnostic imaging, MRI, PET/CT, pulmonary function testing, among others)
  – Facilities may be established in a variety of settings (e.g., free standing, on site of an existing health facility, multi-office complex or mobile)
  – Publicly funded (OHIP) and privately operated and delivered
  – Regulating bodies - MOHLTC, CPSO and CNSC
Glossary

• **OHIP Schedule of Benefits**
  – Concise summary of OHIP (Ontario Health Insurance Plan – provincial healthcare) coverage and benefits for Ontario residents
  – For Independent Health Facilities, the costs of providing licenced services are covered by a funding arrangement. Diagnostic facilities are paid on a standard “fee for service” based on the schedule of Facility Fees.
  – The OHIP schedule of benefits for independent health facilities references two sets of fees:
    • Professional fees
    • Technical fees
Glossary

• **Professional Fees**
  – Compensation to the interpreting physician
  – Submitted using listed fee code with suffix C

• **Technical (Facility) Fees**
  – For independent health facilities these are submitted using listed fee code with suffix B
  – Compensation for the preparing the patient, paying professional staff, conducting diagnostic procedures and all that goes into maintaining equipment and the premises
BUSINESS 101
Business 101

- A Business generates revenue when it exchanges services in return for money or assets. A business incurs expenses by exchanging its assets for goods and services required to generate revenue. A business realizes NET INCOME or PROFIT if its revenues exceed expenses.¹

REVENUES
- Services
- Volumes
- Efficiency
- Prices
- Other

EXPENSES
- Salaries
- Doses
- Rent
- Service
- Other
Business 101

- Revenues
  - Services – Nuclear Cardiology, General Nuclear
  - Volumes – number of tests, longer hours, weekends
  - Efficiency – protocols, efficient staffing, feedback
  - Prices – increase prices?... Out of our control – new legislation would have to be introduced - under Ministry control and there are no changes to the fees on the tests we perform (actually clawing back on professional and technical fees)
  - Other - wildcard
Business 101

- **Expenses**
  - Salaries – raises are given every year, expectation based on profession
  - Doses – radiopharmaceuticals are required for our testing and the vendors have to make money too
  - Rent/Leasing – always increasing
  - Services – service to equipment and properties
  - Other
    - opportunity costs (e.g., no shows)
    - Computers, IT infrastructure, administrative staff, receptionists
    - Licences – CNSC, IHF, CPSO
ECONOMIC CHALLENGES
Economic Challenges

- Disruption of isotopes
- Other modalities competing for comparable testing
- Awareness of radiation dose to public
- Competition for existing pool of referrals – no increase in referrals
- Increase in cost of services and supplies
- Decreasing funding (claw back)
- Elimination of equipment grants
- Increase in licencing fees
FACILITIES
Facilities

- Facility Costs
  - Rent/Lease Costs
  - Utilities
  - TMI – taxes, maintenance and insurance
Facilities

- Sample will use 2000 square foot facility
  - Lease payments
  - Utilities
  - TMI

<table>
<thead>
<tr>
<th>Title</th>
<th>Unit</th>
<th>Annually</th>
<th>Monthly</th>
<th>Daily</th>
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</thead>
<tbody>
<tr>
<td>Lease payments</td>
<td>$12 per sq. ft.</td>
<td>$24,000</td>
<td>$2,000.00</td>
<td>$96.77</td>
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<tr>
<td>Utilities</td>
<td>$500 per month</td>
<td>$6,000</td>
<td>$500.00</td>
<td>$24.19</td>
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<tr>
<td>TMI</td>
<td>$7 per square ft.</td>
<td>$14,000</td>
<td>$1,166.67</td>
<td>$56.45</td>
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</table>
Facility Expense

$177.41 per day

- From our sample 2000 square foot clinic
  - Lease = $96.77/day
  - Utilities = $24.19/day
  - TMI = $56.45/day
STAFF SALARIES
Staff Salaries

- **Staff salaries are the largest expense for most departments**
- Managers and directors try to efficiently schedule staff
- Fine balance between efficiency and good patient care – we do not want to sacrifice the patient experience at the cost of efficiency
Staff Salaries

• Other considerations
  – Benefits
  – Vacation costs
  – Expense allowances
  – Education allowances
  – Training costs
  – Support Staff
    • Cardiology/ECG Technologists
    • Administration Staff
Staff Salaries

- CAMRT Salary Scale Analysis – updated April 2017
- Ontario
- OPSEU Central Wage Rates

<table>
<thead>
<tr>
<th>Title</th>
<th>Start</th>
<th>1&lt;sup&gt;st&lt;/sup&gt; Year</th>
<th>2&lt;sup&gt;nd&lt;/sup&gt; Year</th>
<th>3&lt;sup&gt;rd&lt;/sup&gt; Year</th>
<th>4&lt;sup&gt;th&lt;/sup&gt; Year</th>
<th>5&lt;sup&gt;th&lt;/sup&gt; Year</th>
<th>6&lt;sup&gt;th&lt;/sup&gt; Year</th>
<th>7&lt;sup&gt;th&lt;/sup&gt; Year</th>
<th>8&lt;sup&gt;th&lt;/sup&gt; Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registered Technologist</td>
<td>30.89</td>
<td>32.08</td>
<td>33.42</td>
<td>34.75</td>
<td>36.08</td>
<td>37.41</td>
<td>38.74</td>
<td>40.06</td>
<td>41.40</td>
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<tr>
<td>Senior Technologist</td>
<td>35.41</td>
<td>36.82</td>
<td>38.26</td>
<td>39.64</td>
<td>41.08</td>
<td>42.46</td>
<td>43.90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Charge Technologist</td>
<td>37.44</td>
<td>38.92</td>
<td>40.41</td>
<td>41.90</td>
<td>43.41</td>
<td>44.86</td>
<td>46.39</td>
<td></td>
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</tbody>
</table>
Technologist Salary

$39.28 per hour

- Take the MEDIAN of the OPSEU range of salaries for our case studies
CONSUMABLES
Consumables

• Required to perform everyday duties
• We can try to control by negotiating costs with vendors
• Control product selection
• Items such as gloves, catheters, needles, syringes, etc.
Consumables
Consumables
Consumables

$10.00 per patient

• Gloves per patient
• 10cc saline syringe
• Intravenous extension
• Catheter
• Alcohol swabs
• Bandage/gauze/tape
• ECG leads for gating and/or stress testing
QUALITY CONTROL
Quality Control

- Nuclear Medicine Gamma/Scintillation Camera
- Dose Calibrator
- Survey Meters
Quality Control

- **Nuclear Medicine Gamma/Scintillation Camera**
  - **Daily QC**
    - Co57 Sheet Source
    - Systems tests
    - Image quality
  - **Monthly**
    - Image quality maps
    - Center of Rotation
    - Linearity testing
  - **Annual Maintenance**
    - Done by vendor
    - Mechanical and/or image quality
Quality Control

- **Dose Calibrator**
  - Daily QC
    - Constancy
  - Bi-Annual
    - Linearity Testing
    - Geometric Testing

- **Survey Meters**
  - Calibration testing
Quality Control

- Consider moderate aged equipment
- Annual maintenance subject to package and type of coverage – we will consider full coverage
- Save on dose calibrator linearity testing if you purchase calicheck unit vs yearly rental

<table>
<thead>
<tr>
<th>Title</th>
<th>Unit</th>
<th>Annual Cost</th>
<th>Daily Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co57 Flood Source</td>
<td>$2,000/2 years</td>
<td>$1,000.00</td>
<td>$4.03</td>
</tr>
<tr>
<td>Technologist time</td>
<td>1/2 hr. per day x salary</td>
<td>$4870.72</td>
<td>$19.64</td>
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<tr>
<td>Annual Maintenance</td>
<td>$15,000 annually</td>
<td>$15,000.00</td>
<td>$60.48</td>
</tr>
<tr>
<td>Dose Calibrator Testing</td>
<td>$100 bi-annual testing</td>
<td>$200.00</td>
<td>$0.81</td>
</tr>
<tr>
<td>Survey Meter</td>
<td>$300 annual calibration</td>
<td>$300.00</td>
<td>$1.21</td>
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</table>
QC costs

$86.17 per day

- Consider the camera time used for QC procedures (daily maintenance cost)
- Technologist time for performing QC procedures
- Daily cost of QC sources (broken down to daily charge)
RADIOPHARMACEUTICALS
Radiopharmaceuticals

- **Generator Radiopharmacy**
  - Order generators and kits
  - Responsible for maintenance of good clinical practice and QC – more expenses
  - Distribution to outside locations – transportation costs

- **Unit Dose Radiopharmacy**
  - Vendor ships unit dose
  - Contract will consider transportation costs
  - Negotiation based on many variables including volume expectations – can control costs with increase volume
  - Consider cost for individual kits
Radiopharmaceuticals

• Considerations
  – Radiopharmaceutical costs for those products that are rarely used are usually more expensive
  – If you can generate a lot of doses out of a kit, then the cost per patient dose will decrease
  – For example, cost for MAA and Sulfur Colloid likely work out to be more expensive than MDP and Tetrofosmin/Sestamibi
Dose Cost

$?.00 per day

• Too many variables to consider
• Suitable pricing must be worked out by service provider and vendor
TECHNICAL FEES
Technical Fees

• Technical or Facility Fees
  – For independent health facilities these are submitted using listed fee code with suffix B
  – Compensation for the following:
    • Preparing patient for procedure
    • Performing diagnostic procedure
    • Making arrangements for follow up care
    • Communication with patient and supplying details to the interpreting physician
    • Provide record of results to the referring physician
    • Providing premises, equipment, supplies and personnel for the test
Renal Scan

- Evaluation of renal perfusion and function
- Detection and evaluation of renal collecting system obstruction
- Detection of renal cysts
- Differential diagnosis of renal enlargement and abdominal masses

<table>
<thead>
<tr>
<th>Description</th>
<th>Fee Code</th>
<th>Reimbursement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dynamic Renal Imaging</td>
<td>J834B</td>
<td>$96.25</td>
</tr>
<tr>
<td>Analysis – includes first transit</td>
<td>J835B</td>
<td>$131.70</td>
</tr>
<tr>
<td>Analysis – static renal scintigraphy</td>
<td>J836B</td>
<td>$33.25</td>
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<tr>
<td>TOTAL TECHNICAL FEE REIMBURSEMENT</td>
<td></td>
<td>$261.20</td>
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</table>
Bone Scan

- Detection of bone metastases
- Detection of bony pathology such as avascular necrosis, Paget’s disease, arthritis, metabolic bone disease, etc.
- Evaluation of bone and joint pain of obscure origin
- Localization of sites for biopsy
- Note below that J850 and J851 cannot be billed together (1 or the other)

<table>
<thead>
<tr>
<th>Description</th>
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<th>Reimbursement</th>
</tr>
</thead>
<tbody>
<tr>
<td>First transit with blood pool images</td>
<td>J867B</td>
<td>$57.30</td>
</tr>
<tr>
<td>Bone scintigraphy – general survey</td>
<td>J850B</td>
<td>$103.70</td>
</tr>
<tr>
<td>Bone scintigraphy – single site</td>
<td>J851B</td>
<td>84.85</td>
</tr>
<tr>
<td>Application of tomography (SPECT)</td>
<td>J819B</td>
<td>$43.50</td>
</tr>
<tr>
<td>TOTAL TECHNICAL FEE REIMBURSEMENT (General Survey)</td>
<td></td>
<td>$204.50</td>
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</table>
MPI Scan

- Screening and detection of coronary artery disease by evaluating perfusion to the myocardium
- Classification of left ventricular myocardium as normal, irreversibly ischemic, and reversibly ischemic
- Documentation of myocardial perfusion abnormalities before and after interventional therapy
- Evaluate heart disease in patients with LVH, aortic stenosis, septal hypertrophy, RVH, or congenital heart disease

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<tr>
<th>Description</th>
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<th>Reimbursement</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP scintigraphy – resting, immediate post stress</td>
<td>J807B</td>
<td>$217.55</td>
</tr>
<tr>
<td>MP scintigraphy - delayed</td>
<td>J808B</td>
<td>$80.10</td>
</tr>
<tr>
<td>MP scintigraphy – application of SPECT (delay)</td>
<td>J809B</td>
<td>$43.50</td>
</tr>
<tr>
<td>Myocardial wall motion analysis with EF - rest</td>
<td>J813B</td>
<td>$135.15</td>
</tr>
<tr>
<td>Myocardial wall motion analysis with EF - stress</td>
<td>J814B</td>
<td>$43.50</td>
</tr>
<tr>
<td>MP scintigraphy – application of SPECT (rest)</td>
<td>J866B</td>
<td>$48.15</td>
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<tr>
<td>TOTAL TECHNICAL FEE REIMBURSEMENT</td>
<td></td>
<td>$567.95</td>
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</tbody>
</table>
Case Studies – Renal Scan Day

- 7.5 hours
- 1 nuclear technologist
- 12 patients
Case Study – Renal Scan Day

**REVENUE**
- $261.20 per pt
- X 12 patients
- **$3,134.40**
- Profit =
- **$2,456.22**

**EXPENSES**
- Facilities = $177.41
- Salary for 1 tech = $294.60
- Consumables for 12 patients = $120.00
- QC cost = $86.17
- Dose = ? X 12
- Total = $678.18 + dose cost

**EXCLUSIONS**
- CPSO fees
- CNSC fees
- TLD fees
- Support staff salaries
- Computers and IT
- Radiopharmacy doses
- Miscellaneous
  - Painting contractor
Case Study – Bone Scan Day

- 7.5 hrs
- 1 nuclear technologist
- 6 patients
# Case Study – Bone Scan Day

## Revenue
- $204.50 per pt
- X 6 patients
- **$1,227.00**
- **Profit =**
- **$608.82**

## Expenses
- Facilities = $177.41
- Salary for 1 tech = $294.60
- Consumables for 6 patients = $60.00
- QC cost = $86.17
- Dose = ? X 6
- Total = $618.18 + dose cost

## Exclusions
- CPSO fees
- CNSC fees
- TLD fees
- Support staff salaries
- Computers and IT
- Radiopharmacy doses
- Miscellaneous
  - CPR training for staff
Case Study – Cardiac Day

- 7.5 hrs
- 1 nuclear technologist
- 12 patients
Case Study – Cardiac Day

<table>
<thead>
<tr>
<th>REVENUE</th>
<th>EXPENSES</th>
<th>EXCLUSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>$567.95 per pt</td>
<td>Facilities = $177.41</td>
<td>CPSO fees</td>
</tr>
<tr>
<td>X 12 patients</td>
<td>Salary for 1 tech = $294.60</td>
<td>CNSC fees</td>
</tr>
<tr>
<td>$6,815.40</td>
<td>Consumables for 12 patients = $120.00</td>
<td>TLD fees</td>
</tr>
<tr>
<td></td>
<td>QC cost = $86.17</td>
<td>Support staff salaries</td>
</tr>
<tr>
<td></td>
<td>Dose = ? X 12</td>
<td>Computers and IT</td>
</tr>
<tr>
<td></td>
<td>Total = $678.18 + dose cost</td>
<td>Radiopharmacy doses</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Persantine</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Crash Cart medications</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Miscellaneous</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Fixing leak in washroom</td>
</tr>
<tr>
<td>Profit =</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$6,137.22</td>
<td></td>
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</tbody>
</table>
# Case Study – Closed

## REVENUE
- **$0.00**

## EXPENSES
- Facilities = $177.41
- Salary for 1 tech = $294.60
- QC cost = $86.17
- Total = $558.18

## EXCLUSIONS
- CPSO fees
- CNSC fees
- TLD fees
- Support staff salaries
- Computers and IT
- Miscellaneous
  - New waiting room chairs
# Case Study – Closed

<table>
<thead>
<tr>
<th>REVENUE</th>
<th>EXPENSES</th>
<th>EXCLUSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0.00</td>
<td>Facilities = $354.82</td>
<td>• CPSO fees</td>
</tr>
<tr>
<td>Profit = -$1,379.94</td>
<td>Salary for 1 tech = $294.60</td>
<td>• CNSC fees</td>
</tr>
<tr>
<td>For 124 days</td>
<td>QC cost = $172.34</td>
<td>• TLD fees</td>
</tr>
<tr>
<td>Loss = $171,112.56</td>
<td>Total = $1,379.94</td>
<td>• Support staff salaries</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Computers and IT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Miscellaneous</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• New waiting room chairs</td>
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</tbody>
</table>
Summary

• IF FEASIBLE
• IF POSSIBLE
• IF NECESSARY

• Pick the less expensive product
• Try to efficiently schedule your patients
• Try to squeeze in that urgent referral
Deliver a good service and ADVOCATE FOR OUR PROFESSION!
Thanks!!!

Questions?