TeleMedicine and the Return on Investment

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Return on Investment [ROI]

• A performance measure used to evaluate the efficiency of an investment or to compare the efficiency of a number of different investments.

  • \[ \text{ROI} \% = \frac{\text{Gain of Investment} - \text{Cost of Investment}}{\text{Cost of Investment}} \]
School Bake Sale Model

- Invested $100
- Profited $500

ROI = \frac{\text{Net Profit}}{\text{Investment}} \times 100

ROI = \frac{400}{100} \times 100 = 400\%
School Bake Sale Model

WHAT WE GIVE
(INVESTMENT)

ROI
(WORTH)

COSTS

BENEFITS

WHAT WE GET
(RETURN)

Return on Investment

Application

• Keep in mind that the calculation for return on investment can be modified to suit the situation - it all depends on what you include as returns and costs.

• The term in the broadest sense just attempts to measure the profitability of an investment and, as such, there is no one "right" calculation.
Return on Investment – Flexibility
Return on Investment

Application

• This flexibility has a downside, as ROI calculations can be easily manipulated to suit the user's purposes, and the result can be expressed in many different ways.

• When using this metric, make sure you understand what inputs are being used.
Return on Investment and TeleMedicine

- A return-on-investment methodology is used to assess the financial impact of service-related operating expenses compared to revenue gains from service delivery.
Return on Investment and TeleMedicine

**ROI**
- **Model 1:** Punctuated Returns From Emergent Outcomes
- **Model 2:** Steady Returns

**Gross Savings**
- **Net Savings**
- **Cost**

= major value milestones

**Source of Savings:**
- Faster communication cycles
- Faster access to information
- Better access to expertise
- Improved customer retention
- Increased sales
- Better worker productivity
Nothing in Healthcare is Straight Forward

- Unlike traditional return-on-investment models, in healthcare, benefits are frequently gained from cost avoidance rather than from revenue enhancement activities.

- In Healthcare one must develop a methodology for measuring the direct and indirect costs and qualitative and quantitative benefits of decision support activities.
Nothing in Healthcare is Straight Forward

• Healthcare: cost avoidance rather than revenue enhancement model.
• Many of the early healthcare applications were easily justified on the basis of ROI because they performed office functions quickly and efficiently, helping an organization to become more efficient.
Nothing in Healthcare is Straight Forward

- ROI analysis is not as easily calculated with clinical and decision-support applications, which while clearly adding Value to the patient encounter, may or may not necessarily add revenue to the bottom line.
Nothing in Healthcare is Straight Forward
TeleMedicine and the Return on Investment
One Rural Hospital’s Experience

• During a 4 Year period total of 173 telemedicine encounters

• $145 per four-hour round-trip (factoring in gas, tolls, meals and less tangible costs such as lost wages and child care) Total patient benefit of approximately $25,000.

• Rural hospitals revenues accrued via telemedicine encounters $32,000 ancillary services, procedures, admissions

Watson, Andrew. Telemedicine and ROI. ATA May 2013
One Rural Hospital’s Experience

Calculating ROI

1. Strict definition: Profit $ 32,000; Cost of Program $12,000; ROI 166%
2. Include patient savings: ROI 475%

Watson, Andrew. Telemedicine and ROI. ATA May 2013
Another Rural Hospital’s Experience

- ROI for a 6-month period for a TeleCardiology program
- The hospital saved $540,000 in patient transfer expenses
- The success of that program led to the creation of TeleNeurology and TelePulmonology programs
- ROI benefits can be realized by other healthcare providers and patients alike.
- The benefits are financial but also qualitative that can affect bottom line.
Acute Care Telemedicine

- There are two main categories in acute care TeleMedicine:
  - Specialist access in the emergency care setting where rapid diagnosis and treatment improves outcomes and can optimize patient disposition.
  - Specialist access in the inpatient environment where expert patient management decisions can shorten patient length of stay (LOS) - and where adherence to best clinical practices can greatly reduce morbidity and mortality.

So.. Again this is ROI
The Financial Benefits of Acute Care Telemedicine

- A Florida hospital providing over-night TeleMedicine based critical care services to three community hospitals lowered ICU patient LOS by 0.6 days.
- Generating of over $2 million per year in savings.

Reducing ICU Length of Stay

- **Setting:** ICU in Maryland and Virginia
- **Patients:** Post Surgical
- **TeleMedicine:** Increased rounding in ICU via TeleMedicine by Surgical attending.
- **Outcome:** REDUCTION in LOS of between .3 and 1.0 days in the ICU
- **Impact:** annual savings of **over 1 million dollars** for a single service line when patients are seen more than two times per day by the attending staff.

Increase Access to Care + Lowering the Per Capita Cost

• More clinical services at a far lower cost: Internal utilization of telemedicine
• One healthcare system has lowered the cost of an Emergency Department psychiatric services
• Bricks and Mortar Cost $1,300
• TeleMedicine $100

A 2012 Mayo Clinic study found that hospitals utilizing telemedicine are already demonstrating an annual six-figure savings from early discharges alone - not accounting for the financial benefits of lower staff costs and expanded clinical services.

Available at: http://www.mayoclinic.org/news2012-sct/7192.html
Increase Access to Care +
Lowering the Per Capita Cost

• **Reduction in patient transfers:** In the case of telestroke services, about 30% of consultations result in a patient transfer.

• Through TeleMedicine the patient can be appropriately treated at the local hospital.
Increase Access to Care + Lowering the Per Capita Cost

- This reduction in patient transfers adds inpatient stays for the local hospital, eliminates transport costs, keeps the patient close to home and family, and keeps scarce high-cost beds in the tertiary center open.
Expand the in-catchment service area: Telemedicine networks can significantly expand the hospital's service area and market share.

TeleMedicine allows for evaluating and screening patients for complex medical and surgical services at their local hospital or clinic.

Build It and They Will Come

Expanding the in-catchment service area:

- The Michigan Stroke Network nearly tripled the size of its overall neuroscience program over three years.

- The University of California-Davis Pediatric Telemedicine program has doubled the number of pediatric transfers.

Community and Rural Hospital

- **Fractional Ownership of Medical Specialists:** Telemedicine frees community hospitals from the high cost of incentivizing and relocating specialty physicians.
- Through telemedicine, specialized medical services can now be delivered in bite-size increments to locations where access to these services was previously not available.
Application of Theory
The Law of Diffusion of Innovation
The law of diffusion of innovation

- 2.5% Innovators
- Early Adopters 13.5%
- Early Majority 34%
- Late Majority 34%
- Laggards 16%

The tipping point
Structures Affecting ROI

- Budgeting structure - silos
- Telemedicine cost structure
- Reimbursement and billing
- Staffing models
- Staff and patient adoption
- Data collection and access
- Reporting structures
Measuring and Reporting Facility ROI

- ROI Correlated to FACILITY GOALS
  - Financial Outcomes
  - Clinical Outcomes
  - Quality Measures
  - Compliance with Service Mandates
  - Catchment Area Growth
  - Patient Adoption
  - Patient and Provider Satisfaction
Financial ROI - Telemedicine Specialty Services

• Cost Avoidance
  o Reduce Costly Risks Associated with Specialty Diagnoses
  o Reduce Costly Transfers
  o Lower Incidence of Costly Complications
  o Decrease Ancillary & Pharmaceutical Costs

• Cost Containment
  o Decrease Ancillary & Pharmaceutical Costs
  o Reduce ICU Length of Stay, Outliers & Mortality Rates
  o Decrease Costly ED Episodic Care
  o Decrease Need for Physician Registry

• Positive Gain
  o Create Competitive Advantage, Market Differentiation
  o Retain downstream ancillary and primary care revenues
  o Increased Ability for Grant Funding
  o Improve Physician Recruiting Capabilities
Clinical ROI - Telemedicine Specialty Services

- Improve Management of Care Through Access to Specialists
- Develop Quality Measures Using Metrics
- Increase Compliance on Service Mandates
- Improve Patient Retention & Satisfaction
- Increase On-Call Coverage
- Minimize Disruptions
- Increase Care Consistencies
- Improve Patient Triage & Flow
- Improve Attending Physician Satisfaction & Confidence
Telemedicine ROI Three Examples – The TeleMed2U Experience

1. **Hospital:**
   - Telemedicine based Antimicrobial Stewardship Program

2. **Multi-facility Health System:**
   - Multi-specialty Telemedicine Program

3. **Outpatient Facility:**
   - Single Specialty Telemedicine Program
Hospital Antibacterial Stewardship Program

- In 2007, 83-bed hospital implemented inpatient telemedicine-based infectious diseases program with TeleMed2U:
  - First of its kind telemedicine-based Antimicrobial Stewardship Program (ASP)
  - Structure and oversight of ASP committee that identified improper utilization of Fluoroquinolone and Piperacillin/Tazobactam
  - Educational campaign for physicians on appropriate use of these antimicrobials
  - Patient consultations using telemedicine
Hospital ROI

• Without restricting use of either microbial, the results from 2008 to 2011 were a reduction in use of:
  o Fluoroquinolone - 77%
  o Piperacillin/Tazobactam - 72%

• Resulting cost savings approx. $100,000 /yr.

• The hospital is fully complaint with California State Law, Senate Bill 739 which mandates that acute care hospitals monitor and evaluate utilization of antibiotics through a quality improvement committee with oversight responsibility for the use of these medications.
Multi-Facility Health System

• TeleMed2U provides 16 separate medical specialties

• Provider goals for their telemedicine program:
  o Improve access to care – reduce physician registry costs.
  o Increase the number of telemedicine-appropriate referrals for patients requiring specialty care (increase patient adoption)
  o Avoid medical transport costs
Multi-Facility Health System ROI

- Improve access to care - physician registry costs.
  - Physician registry costs have declined 75% in the past three years, largely due to the telemedicine program
- Increase the number of telemedicine-appropriate referrals for patients requiring specialty care (increase patient adoption)
  - Utilization has improved 11% since 2011 (48% in 2011, 55% in 2012, 59% in 2013)
- Avoid medical transport cost:
  - in 2013, consultations performed by TeleMed2U resulted in approx. $794,483 medical transport costs avoidance
TeleMed2U has been providing an endocrinology telemedicine service for past six months.

Provider goals for diabetes:
- Improve disease management through access to specialty care
- Quantifiably improve Hemoglobin A1C levels
- Increase # of un- and underinsured patients treated whose nearest accepting facility is a 260 mile roundtrip away

Data collection underway to measure cost avoidance for:
- ED visits for diabetic ketoacidosis (DKA)
- Treating complications from non-management including: kidney, heart, foot, skin, nerve and eye conditions
- Pharmaceutical costs associated with complications
# Travel Cost to Patient Without TeleMedicine

- Nearest accepting facility for un- and underinsured endocrinology patients is:
  - **260 mi. roundtrip; 4 – 6 hrs.,** depending upon traffic
  - **25.4 MPG** (national average, national news source April 2014)
  - **$3.83 per gallon** (ave. for community, April 2014, online news source)

### Patient out-of-pocket transportation costs:

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost 1</th>
<th>Cost 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day’s missed wages: (CA min. wage 7/14 - $9/hr.)</td>
<td>$78.00</td>
<td>$156.00</td>
</tr>
<tr>
<td>Cost of gas for 260 mi.</td>
<td>$38.83</td>
<td>$38.83</td>
</tr>
<tr>
<td>Travel meal</td>
<td>$12.00</td>
<td>$24.00</td>
</tr>
<tr>
<td>Tolls both ways – San Francisco Bridge &amp; Hwy 80</td>
<td>$10.00</td>
<td>$10.00</td>
</tr>
<tr>
<td>Parking (UCSF $3.50/hour, max $28/day)</td>
<td>$10.50</td>
<td>$10.50</td>
</tr>
<tr>
<td>Babysitter – est. 8 hours min.</td>
<td>$80.00</td>
<td>$160.00</td>
</tr>
</tbody>
</table>

**Total:** $229.33

*Note: calculations assume one roundtrip, two ways.*
Health System Pilot TeleMedicine Program

Multi-specialty TeleMedicine Program linking 4 out-patient clinics to the hospital

- ROI $2.44 per patient seen
- Decreased cost of care $12,937 to $1,231 per clinic
- Decreased average admissions 1.43 to 0.20
- Overall patient satisfaction 95%
Summary

A growing body of evidence supports the conclusion that **TeleMedicine** improves/expands:

- Access to clinical applications
- Improve quality of care
- Enhances patient safety
- Reduces lengths of stay
- Increase efficiency
- Increases access to care
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