Viable Vision

...is achievable in Health Care

Presented By: Dr. Gary Wadhwa
President, Adirondack Oral & Maxillofacial Surgery

Board Certified Oral & maxillofacial Surgeon

MBA, CBBSS, MBB, CQM/OE, Certified Lean Black Belt, Certified BSC, System Dynamics, TOC Student at WSU
Overview: Viable Vision

... an achievable goal in health care

- Adirondack Oral & Maxillofacial Surgery 1st viable vision achieved using TOC/Lean/Six Sigma tools… without formal TOC Training

- 2nd Viable vision using Reliability & Rapid Response Template available in Public Domain

- Viable Vision for larger Health Care Systems
Detailed Overview

- Case History of Adirondack Oral & Maxillofacial Surgery. 1st viable vision achieved using TOC/Lean/Six Sigma
  - TOC
  - Lean Tools
  - Six Sigma
  - System Dynamics
  - Balance Score Card

- 2nd Viable vision using Reliability & Rapid Response Template
  - Conflicts in Goals, measurements and policies
  - Culture in Health Care
  - Staff Availability and Training
  - Environmental Factors: Medico-legal, Regulatory

- Application to larger Health Care Systems
  - Resolve Conflicts in Goal upfront, Set Goals and agree upon Measurements and policies
  - Focus Lean Six Sigma efforts in Key areas, Operating Rooms, Emergency Departments and LOS
  - Customer and Staff Development Focus
Oral & Maxillofacial Surgery department, a specialty practice affiliated with local university teaching hospital & medical college …identified constraints - doctor

- **Space**: 1200 Sq ft and Operating Room availability on limited block time
- **Staff**: Surgeons 2 full time and 1 part time; Nursing and Administrative 9 or 10
- **Type of Services**: Trauma, Head & Neck Pathology/Reconstructive Surgery, Routine Oral surgery like wisdom teeth removal and Dental Implants
- **Reimbursement**: Medicaid, Medicare, Few Private insurers, and fewer fee-for-service

![Pie chart showing time-consuming and least profitable services]

- Wisdom teeth & Ext
- Dental implants
- Jaw Sx
- Oral Path
- Facial Trauma surgery
- TMJ Sx
- Cosmetic Sx
TOC

Throughput (T) = ($/Patient * # of patients) – variable cost of treating these patients (Materials)

- **Increase the patients seen per doctor, Exploit & Subordinate the Constraint**
  - **Space Constraint Elevated:** Hospital space was approx 1200 sq ft, opened two sites, total approx. 8000 sq ft; it increased the OE but no increase in Profits
  - **Hired more Doctors:** It created more chaos, staff quit rate increased the company lost money
  - **Support Staff Constraint Elevated:** Trained and hired more staff to allow the maximization of Doctor time utilization. This resulted in significant financial improvements

- **Increase $/Patients:** Pareto the patients & procedures into types A, B, C based upon revenue generated
Lean Implementation

- Understand Value Stream Mapping
  - Value Added Time
  - Non Value Added Time

- Lean Tools
  - 5 S or 6 S
  - SWF
  - Set Up Reduction
  - TPM
  - Supplies and Material Management

- Demand and Capacity Management

- Supply Chain Management
Lean

TOCICO 2007 Conference

Value Added Time

Process Time: 41 min

Wait Time

5 min

10 min

15 min

5 min

10 min

2 min

8 min

5 min

32 min

Total Value Quotient: 41/(41+32) = 56%
To reduce this “flow time” through the network, we did the following things:

Reduce number of queues that hold up progress by:

- Utilizing concurrency or continuous flow
  - Concurrency
    - Greeting of patient and check in process
    - Doctor/Assistant and Check out process
Lean Supply Chain Management
System Dynamics

Policy Development...Focus on Staff Work Load & Training
### Six Sigma

Reduction in Accounts Receivables

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2006</th>
<th>% Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Ins. Related</td>
<td>336</td>
<td>55</td>
<td>84%</td>
</tr>
<tr>
<td>Medicaid</td>
<td>90</td>
<td>15</td>
<td>83%</td>
</tr>
<tr>
<td>Private Pay</td>
<td>130</td>
<td>64</td>
<td>51%</td>
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</tbody>
</table>

Private payment current A/R has less than 2% unpaid accounts now compared to 50% in 2002.
Six Sigma

AOMS Customer Satisfaction Index

Overall Customer Satisfaction

Individual Value

- X̄ = 4.713
- UCL = 5.264
- LCL = 4.162

Moving Range

- MR = 0.2072
- UCL = 0.6769
- LCL = 0

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Six Sigma Tools

- FMEA to reduce Anesthesia Problems, Medical Records completion, Insurance billing
- Analyzing the patient calls to nursing station using DMAIC tools to reduce number of calls
- DMAIC tools for billing cycle improvements
- Pareto analysis:
  - Doctor time waste analysis
  - Patient complaints analysis
  - Reconciliation errors
- DFSS tools like Axiomatic Design tools to customize each patient treatment, identify steps and communicate across the network, place controls at critical points
- DOE tools to improve client relationship development
Adirondack OMS 1st Viable Vision

<table>
<thead>
<tr>
<th>Year</th>
<th>Charges</th>
<th>Collections</th>
<th>Expenses</th>
<th>Profits</th>
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<td>2001</td>
<td>4190250</td>
<td>2174567</td>
<td>2073383</td>
<td>101184</td>
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<tr>
<td>2002</td>
<td>4806307</td>
<td>2819595</td>
<td>2213722</td>
<td>606228</td>
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<td>2003</td>
<td>5544649</td>
<td>3201432</td>
<td>2315061</td>
<td>886371</td>
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<tr>
<td>2004</td>
<td>6469285</td>
<td>4002588</td>
<td>2828885</td>
<td>1173703</td>
</tr>
<tr>
<td>2005</td>
<td>6502818</td>
<td>4503835</td>
<td>2821954</td>
<td>1681882</td>
</tr>
<tr>
<td>2006</td>
<td>7115183</td>
<td>5311128</td>
<td>3196018</td>
<td>2115110</td>
</tr>
</tbody>
</table>

Expenses/Collections Decreased from 95% to 60%
Profits increased by 1990%
AOMS Performance Metrics

Increase in Collections

Increase in Profits

Increase in $/Patient Value

Time Series Plot of % Collection

Time Series Plot of $ Collection/patient

Time Series Plot of Expenses/Collections

Empirical CDF of No. of patients
Key Success Factors

- Physical Constraints removed using tools
  - 5 Focusing steps of TOC
  - Drum/Buffer/Rope
  - Lean, Continuous Flow
  - Six Sigma

- Cultural Constraints removed
  - Innovative Leadership
  - Transparency, openness
  - Teamwork & communication, weekly staff meetings
  - Staff cross training and staff retention
  - Performance Reviews with incentive systems like bonus
    - Presence at work
    - Attendance at Process Improvement meetings
    - Giving innovative ideas for improvement
    - Team work 360 degree review
    - Number of cross trained skills, Flexibility at work
Detailed Overview

• Case History of Adirondack Oral & Maxillofacial Surgery, 1st viable vision achieved using TOC/Lean/Six Sigma
  − TOC
  − Lean Tools
  − Six Sigma
  − System Dynamics
  − Balance Score Card

• 2nd Viable Vision using Reliability & Rapid Response Template
  − Conflicts in goals, measurements and policies
  − Culture in Health Care
  − Staff Availability and Training
  − Environmental Factors: Medico-legal, Regulatory

• Application to larger Health Care Systems
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  − Customer and Staff Development Focus
Core Conflict

A-5: Have a successful Practice
B-5: Improve throughput by treating profitable & charitable patients
C-5: Run Profitable Practice by Cost Containment
D-5: Hire staff to handle welfare patients, complex trauma cases
D’-5: Do not hire too much staff

Core Conflict is Throughput vs. Cost Accounting
Simple Financial Measurements adopted despite cost accounting and Activity Based Costing in Executive MBA

- \( P \) (Profits) = \( T - OE \) \{\( \text{Money Collected for patient care-money returned to patients-variable costs like labs, material costs} \) \} – Operating Expenses
- \( \text{ROI (Return on Investment)} = \frac{T - OE}{I} \) \( \text{(Investment)} \)
- \( \text{EVA (Economic value Added)} = \text{NOPAT} \text{ (Net Operating Profits after Taxes – WACC (Weighted Average Cost of Capital)} \) \* $ I \text{ (Capital Investment)} \)

Common Sense Business Decisions

- Select the Customers that you want to serve, provide WOW service
- Increase Throughput
- Make Investments that result in higher ROI in a long run
- Develop Staff
Scenario A Treatment plan: Extractions, Anesthesia  Total Payment = $2000, total time utilization is as follows

- Check in Register 15 min
- Assisting 15 min
- Doctor time 60 min
- Check out Billings 25 min

Scenario B Treatment plan: Implants, Extractions, Bone grafts. Total Payment = $4000, total time utilization is as follows

- Check in Register 30 min
- Assisting 15 min
- Doctor time 240 min
- Check out Billings 10 min
Scenario A using accounting based upon constraints

- Throughput (T) = $2000 – $200 (Lab & Material Cost) = $1800
- Rolled Yield = 0.999
- Overhead Expense/hour = $200
- Profits/hr = T – OE = $1800 - $200 = $1600/hour

Scenario B using the same accounting method

- Throughput (T) = $4000 – $1000 (Lab, bone graft, implant cost)
- Rolled Yield = 0.9 (10% failure rate)
- Adjusted T = 0.9 * 3000 = $2700
- Overhead Expense/hour = $200 * 4 hours = $800
- Profits/hr = T - OE ($2700 – $800)/4 = $475/hour
- We have not added the Medico-legal risk factors

Scenario C (Hospital Based Procedures)

- Throughput (T) = $2000 - $0 (hospital bears the material costs)
- Rolled Yield = 0.999
- Overhead Expenses/hour = $200 * 5 = $1000
- Profits/hr = T – OE ($2000 – 1000)/5 = $200/hr
2nd Viable Vision

1
Viable Vision
Profits equal to current collections by 2010

Base Growth

2:1
Reliability
Comp. edge

Enhanced Growth

2:2
Rapid
Comp. edge

Build
Capitalize
Sustain

3:1
99%
DDP

3:2
Reliability
Selling

3:3
Expand
Client Base

3:4
Load
Control

3:5
Capacity
Elevation

3:6
LT
1/4

3:7
RR Load
Control

3:8
RR
Selling

3:9
Expand
RR client base

4:1
4:12
4:21
4:22
4:23
4:24
4:25
4:31
4:32
4:33
4:41
4:42
4:51
4:52
4:61
4:62
4:71
4:72
4:81
4:82
4:83
4:84
4:91
4:92
461
471
472
481
482
483
484
491
**Strategy:**
AOMS Company is solidly on the Process improvement path using TOC, Lean, Six Sigma
Viable Vision is realized in less than 4 years.

<table>
<thead>
<tr>
<th>Parallel assumptions</th>
<th>For AOMS to realize the V V its T must grow (and continue to grow) OE in relation to T must decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Avoiding high risk procedures like Trauma, Treatment to sue happy welfare patients and stopping influx of low paying patients, is advisable</td>
</tr>
<tr>
<td></td>
<td>Availability of Oral &amp; Maxillofacial surgeons &amp; trained staff is severely limited</td>
</tr>
<tr>
<td></td>
<td>Market is saturated with well established Oral &amp; Maxillofacial Surgeons</td>
</tr>
</tbody>
</table>

| Tactic               | Build a decisive competitive edge and capabilities to capitalize on Reliable Services and keep hand in different markets except where we have high risk of failures and law suits like trauma, cosmetic surgery |

<p>| Sufficient assumptions | The way to have a decisive competitive edge is to satisfy Referring doctors and patients significant need to an extent that no significant competitor can Use Market Segmentation principles |</p>
<table>
<thead>
<tr>
<th>Necessary Assumption</th>
<th>Wait time in health care industry is notoriously bad and long lead time has major consequences both for patients and for the company, reliability is a significant need.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategy</td>
<td>A decisive competitive edge is gained minimizing wait time, eliminating waste in between hand offs, decrease the total Lead Time per patient within the different family of procedures</td>
</tr>
<tr>
<td>Parallel assumptions</td>
<td>Promises are cheap. Putting money to back-up promises. Paying patients money back for their wait from scheduled due time + predetermined tolerance limits for patients</td>
</tr>
<tr>
<td>Tactic</td>
<td>The Company is remarkably good at meeting its promised On-Time care and offers of hefty penalties for each time patient has to wait a long time. The competitors are in a different world, they will not even dare try it. Their assumptions are that the patient should wait for the doctors</td>
</tr>
<tr>
<td>Sufficient assumptions</td>
<td>Building a decisive competitive edge is not easy; building the capabilities to capitalize on it is not less difficult. But, sustaining these two elements is the real challenge.</td>
</tr>
</tbody>
</table>
| Necessary assumptions | Offering a penalty and having to pay the penalty can create the opposite reputation to the one desired.  
|                       | Hefty penalties can erase the Company’s profits |
| Strategy              | The Company has very high on time, and due-date performance |
| Parallel assumptions  | S-DBR, CCPM together with Buffer Management brings most environments to due-date performance of >99%  
|                       | Small organization with limited resources has difficulty in implementing |
| Tactic                | The Company implements S-DBR, CCPM and BM; Using Pareto charts on daily basis, a log is kept for what uses the buffer time most. Process improvements are focused on that. |
| Sufficient assumptions| To ensure an outstanding start of a major project like achievement of over 99% on time care, it is vital to ensure each patient is treated on time without delays |
1. Viable Vision

Base Growth

2:1 Reliability Comp. edge

3:1 99% DDP
3:2 Reliability Selling
3:3 Expand Client Base
3:4 Load Control
3:5 Capacity Elevation

Build

Capitalize

Sustain

4:11 Choking the release
4:12 Managing priorities
4:13 Dealing with CCR’s
<table>
<thead>
<tr>
<th>4:11</th>
<th><strong>Choking the Release</strong></th>
<th>Descends from 3:1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Necessary assumptions</strong></td>
<td>Having too many patients in the schedule, and in the pipeline masks priorities, increases wait time between stations, disrupts On-Time-performance.</td>
<td></td>
</tr>
<tr>
<td><strong>Strategy</strong></td>
<td>The office is populated ONLY with patients that have to be taken care within a predefined horizon.</td>
<td></td>
</tr>
<tr>
<td><strong>Parallel assumptions</strong></td>
<td>- Total touch time is approximately 60% of the lead time at present - In health care there is Random Arrival time of patients and there is Queues at every station. Standardization of the stations and processes but flexibility with patients and referring doctors will improve, if the scheduling process chokes the release of the patients which is hard. - Focusing on high end patients gives the company bad reputation - Marketing to get high end patients also has negative Public Relation effect - Training staff is hard in these concepts</td>
<td></td>
</tr>
<tr>
<td><strong>Tactic</strong></td>
<td>For each service family, a buffer time is set to be equal to 50% of the current lead-time. The Doctor time is paced and resource buffers are placed around the doctor. To compensate for random arrivals and variations, block of patients booked and buffers placed equal to 50% of total lead time</td>
<td></td>
</tr>
<tr>
<td>4:12</td>
<td>Managing the Priorities</td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>------------------------</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>TOCICO 2007 Conference</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Necessary assumptions</strong></td>
<td>Hectic priorities (hot, red-hot and do-it-NOW) cause chaos in the office. Even when patient release is properly choked, not having a priority system can cause some delays.</td>
<td></td>
</tr>
<tr>
<td><strong>Strategy</strong></td>
<td>The Operating room and Consultation room usage is governed by a simple, yet robust, priority system.</td>
<td></td>
</tr>
<tr>
<td><strong>Parallel assumptions</strong></td>
<td>Vast experience has shown that Buffer Management* is a robust priority system that leads to even better OTP or DDP. *BM is setting priorities (three color-code system) only according to the degree the buffer-time is consumed.</td>
<td></td>
</tr>
<tr>
<td><strong>Tactic</strong></td>
<td>Buffer Management is the ONLY priority system used in health care practice.</td>
<td></td>
</tr>
</tbody>
</table>
Viable Vision

Base Growth

1

Reliability Comp. edge

Build

Capitalize

Sustain

3:1
99% DDP

3:2
Reliability Selling

3:3
Expand Client Base

3:4
Load Control

3:5
Capacity Elevation

4:11
Choking the release

4:12
Managing priorities

4:13
Dealing with CCR’s

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<table>
<thead>
<tr>
<th>Necessary assumptions</th>
<th>There are Capacity Constraint Resources (CCR’s) that prevent the attainment of 99% DDP or On Time Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategy</td>
<td>Patients are seen and treatment completed on time (over 99%)</td>
</tr>
<tr>
<td>Parallel assumptions</td>
<td>- Doctors/Nurses are CCR and work-in-process piles up in front of it.</td>
</tr>
<tr>
<td></td>
<td>- In most of the cases additional capacity can be exposed by simple means like:</td>
</tr>
<tr>
<td></td>
<td>- Ensuring that CCR is adequately buffered</td>
</tr>
<tr>
<td></td>
<td>- Offloading work from the CCR’s to less “effective” work centers</td>
</tr>
<tr>
<td></td>
<td>that are maintained at ample excess capacity</td>
</tr>
<tr>
<td></td>
<td>- Using LEAN techniques to shrink the set-up time between patients and move set up outside the operating area.</td>
</tr>
<tr>
<td></td>
<td>- Giving overtime approval to staff that protects the  CCR’s, etc.</td>
</tr>
<tr>
<td></td>
<td><strong>Note – In most cases the steps taken so far will be sufficient to prevent the CCR’s from jeopardizing On Time Performance</strong></td>
</tr>
<tr>
<td>Tactic</td>
<td>CCR’s are identified and effectively buffered. When On Time Performance &gt;99% is achieved, the green light is given to Customer service to increase referrals. To prevent remerging of CCR’s it is essential to move rapidly to implement training and buffer staff around CCR</td>
</tr>
</tbody>
</table>
2nd Viable Vision

<table>
<thead>
<tr>
<th></th>
<th>Patients</th>
<th>Charges</th>
<th>Collections</th>
</tr>
</thead>
<tbody>
<tr>
<td>1Q/2007</td>
<td>1354</td>
<td>$2,055,108.00</td>
<td>$1,483,288.00</td>
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<tr>
<td>1Q/2006</td>
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<td>$1,796,621.00</td>
<td>$1,412,943.00</td>
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<tr>
<td>Change</td>
<td>177</td>
<td>$258,487.00</td>
<td>$70,345.00</td>
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<tr>
<td>2Q/2007</td>
<td>1319</td>
<td>$1,962,265.00</td>
<td>$1,518,373.00</td>
</tr>
<tr>
<td>2Q/2006</td>
<td>1204</td>
<td>$1,687,788.00</td>
<td>$1,241,257.00</td>
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<tr>
<td>Change</td>
<td>115</td>
<td>$274,477.00</td>
<td>$277,116.00</td>
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<tr>
<td>3Q/2007</td>
<td>1458</td>
<td>$2,401,251.00</td>
<td>$1,762,460.00</td>
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<tr>
<td>3Q/2006</td>
<td>1322</td>
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<td>Change</td>
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<td>$417,787.00</td>
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<td>1,2,3 Q/2007</td>
<td>4131</td>
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<tr>
<td>1,2,3 Q/2006</td>
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<td>$5,373,617.00</td>
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<tr>
<td>Change</td>
<td>428</td>
<td>$1,045,008.00</td>
<td>$767,247.00</td>
</tr>
</tbody>
</table>

……… same number of doctors and same number of staff
Core Conflict Resolution

A-4: Have Successful Practice

B-4: Increase throughput of selected Patients

C-4: Control Overhead expenses

D-4: Hire staff to handle mix of patients and procedures

D'-4: Do not hire staff

Aspt7: See only select few patients, control expenses by hiring fewer staff

Aspt8: Treat patients to make profits and get satisfaction from some of the complex cases

INJ1: Educate Partners in "TOC Accounting & Thinking Process"

INJ2: Improve Throughput of Profitable patients, dedicate 20% time to complex & Poor patients

Still need to work on this with Partners
Culture

Problem

- Departmental Mentality: nursing vs. administrative, individual vs. team work
- High specialization & poor cross training
- Shift workers vs. demand for services
- Multi-tasking
- Blame game especially the doctors

Solutions:

- Educate Leaders, Managers, staff in TP and Strategy/Tactics
- Educate in Problem Solving, Root Cause Analysis Techniques
- Incentives for Cross Training & Team Work
- Project Portfolio Management, CCPM
Staffing

Problems:

- Shortage of skilled staff for health care industry
- Shortage of Oral & Maxillofacial Surgery specialists
- Shortage of training programs for staff

Solutions:

- Increase attractiveness of your practice due to higher salaries, state of the art equipment, and less chaos
- Create internal training program by recruiting teachers trained in TOC/Lean/Six Sigma methods and using internal subject matter experts-the experienced workers
- Use CCPM to develop projects in staff and doctor training
- Incentives for more skills obtained
Environmental, Medico-Legal, Regulatory

- FMEA
- Customer Satisfaction Index
- Reliability of Services, Rapid Response to Emergency needs of patients
- Concept of Patients as Customers
Detailed Overview

Case History of Adirondack Oral & Maxillofacial Surgery. 1st Viable vision achieved using TOC/Lean/Six Sigma; working on a 2nd Viable vision using Reliability & Rapid Response Template

- TOC
- Lean Tools
- Six Sigma
- System Dynamics
- Balance Score Card
- Viable Vision RRR Template

Obstacles and how to overcome them

- Conflicts in Goals, measurements and policies
- Culture in Health Care
- Staff Availability and Training
- Environmental Factors: Medico-legal, Regulatory

Application of Viable Vision RRR Template to Larger Health Care Systems

- Resolve Conflicts in Goal upfront, set Goals and agree upon Measurements and Policies
- Focus on Key areas, Operating Rooms, Emergency Departments and LOS
- Focus Lean and Six Sigma Efforts
- Customer and Staff Development Focus
Viable Vision
Health Care Industry in General

- Start with Top Management:
  - Clear Goals
  - Agree upon Measurements and Decision Process (Shun Cost Accounting)
  - Resolve Conflicts
- Global System Thinking vs. Department Thinking (Global Throughput Accounting)
- Focusing steps/Lean/Six Sigma efforts to Constraints in Flow
- Patient/Customer
  - Select desired patient segments to treat
  - Select procedures offered
  - Improve throughput of patients by identifying constraint, exploiting and subordinating to the constraint
  - Provide reliable service, Rapid Response to patient needs
  - Elevate the constraint to the Market
- Align your Staff and Capacity to Patient care
- Market the Reliability and Rapid Response in the community
  - Offer 10 to 20% capacity to community Charitable service

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Thank You!