"Developing Predictive Balanced Scorecards for Hospitals"

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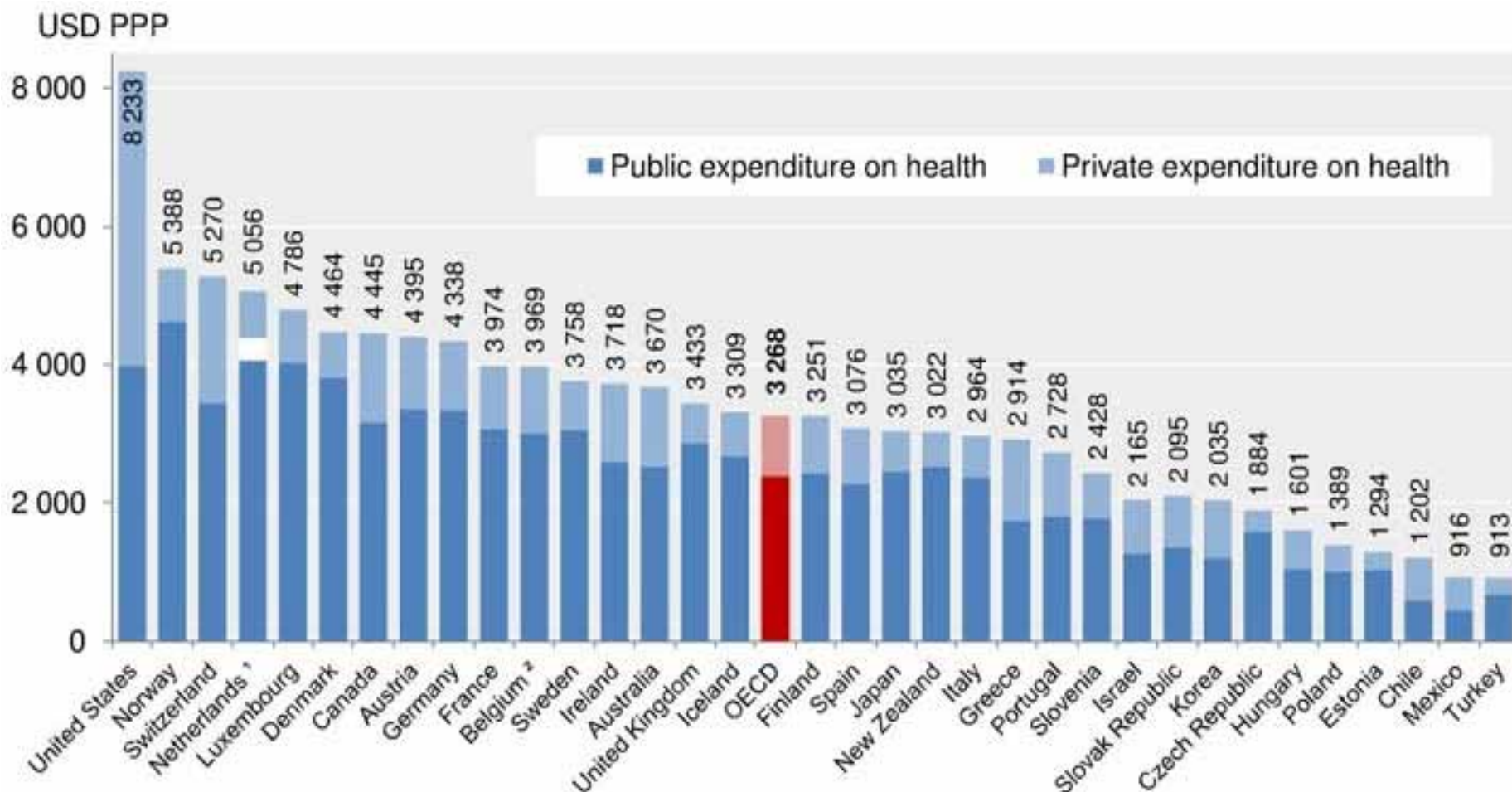Henry Ford Hospital
Dearborn, MICHIGAN

Presentation Outline

1. Background facts – Economic indicators

2. Sources of data for study

3. Scope of study

4. Defining Total Patient Experience (TPE)
   a. Qualitative aspects
   b. Quantitative aspects

5. Applying lean tools

6. Conclusion

1. Background Facts – Economic Indicators

US Public and Private Expenditure on Healthcare – 2010 (Excludes Investments)

USD PPP

Legend: ■ Public expenditure on health ■ Private expenditure on health

Country	Total
United States	8 233
Norway	5 388
Switzerland	5 270
Netherlands	5 056
Luxembourg	4 786
Denmark	4 464
Canada	4 445
Austria	4 395
Germany	4 338
France	3 974
Belgium	3 969
Sweden	3 758
Ireland	3 718
Australia	3 670
United Kingdom	3 433
Iceland	3 309
OECD	3 268
Finland	3 251
Spain	3 076
Japan	3 035
New Zealand	3 022
Italy	2 964
Greece	2 914
Portugal	2 728
Slovenia	2 428
Israel	2 165
Slovak Republic	2 095
Korea	2 035
Czech Republic	1 884
Hungary	1 601
Poland	1 389
Estonia	1 294
Chile	1 202
Mexico	916
Turkey	913

(OECD Healthcare Data Published 2012)

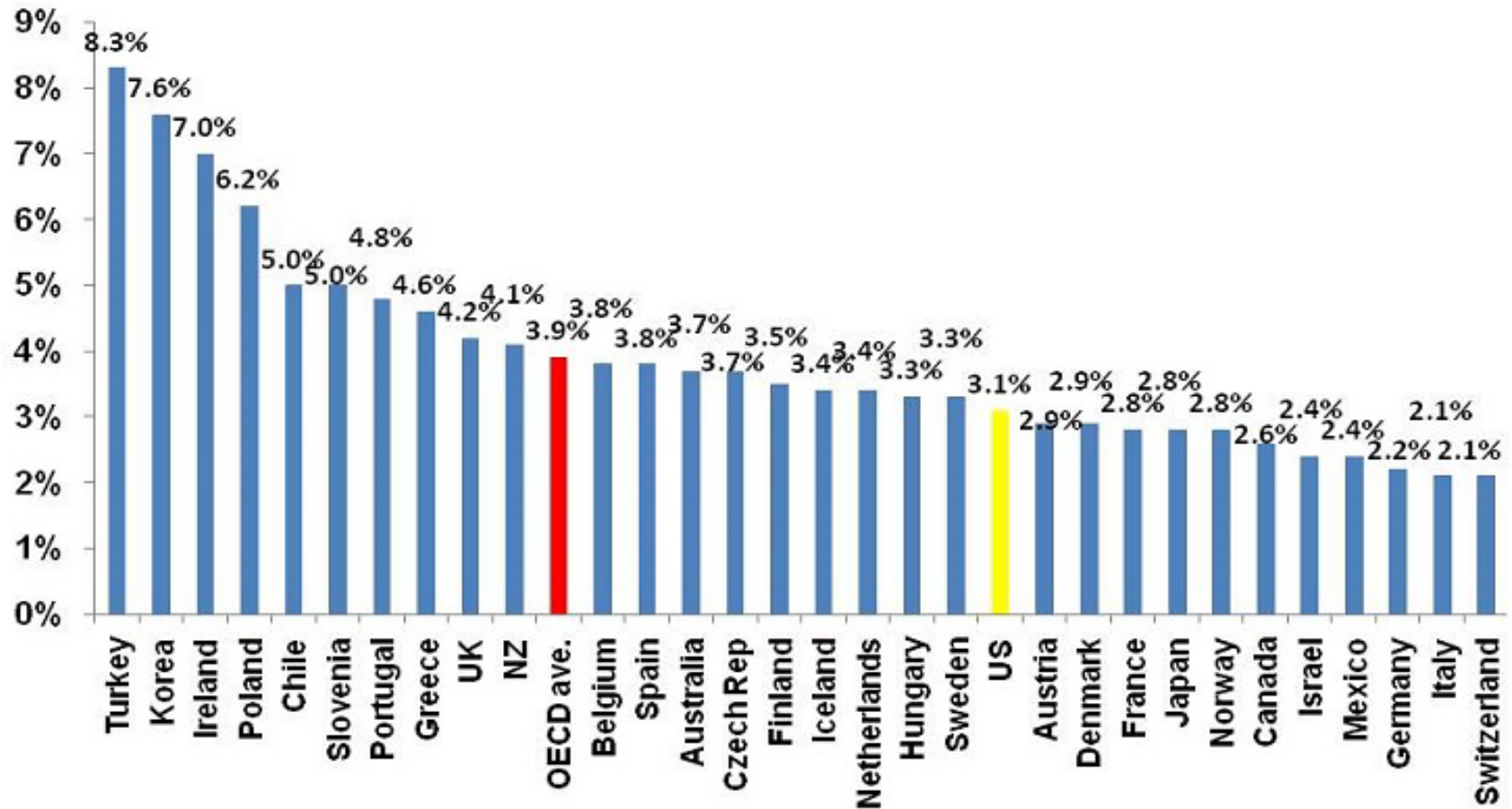# 1. Background Facts – Economic Indicators

US Public and Private Expenditure on Healthcare as a Percent of GDP - 2010
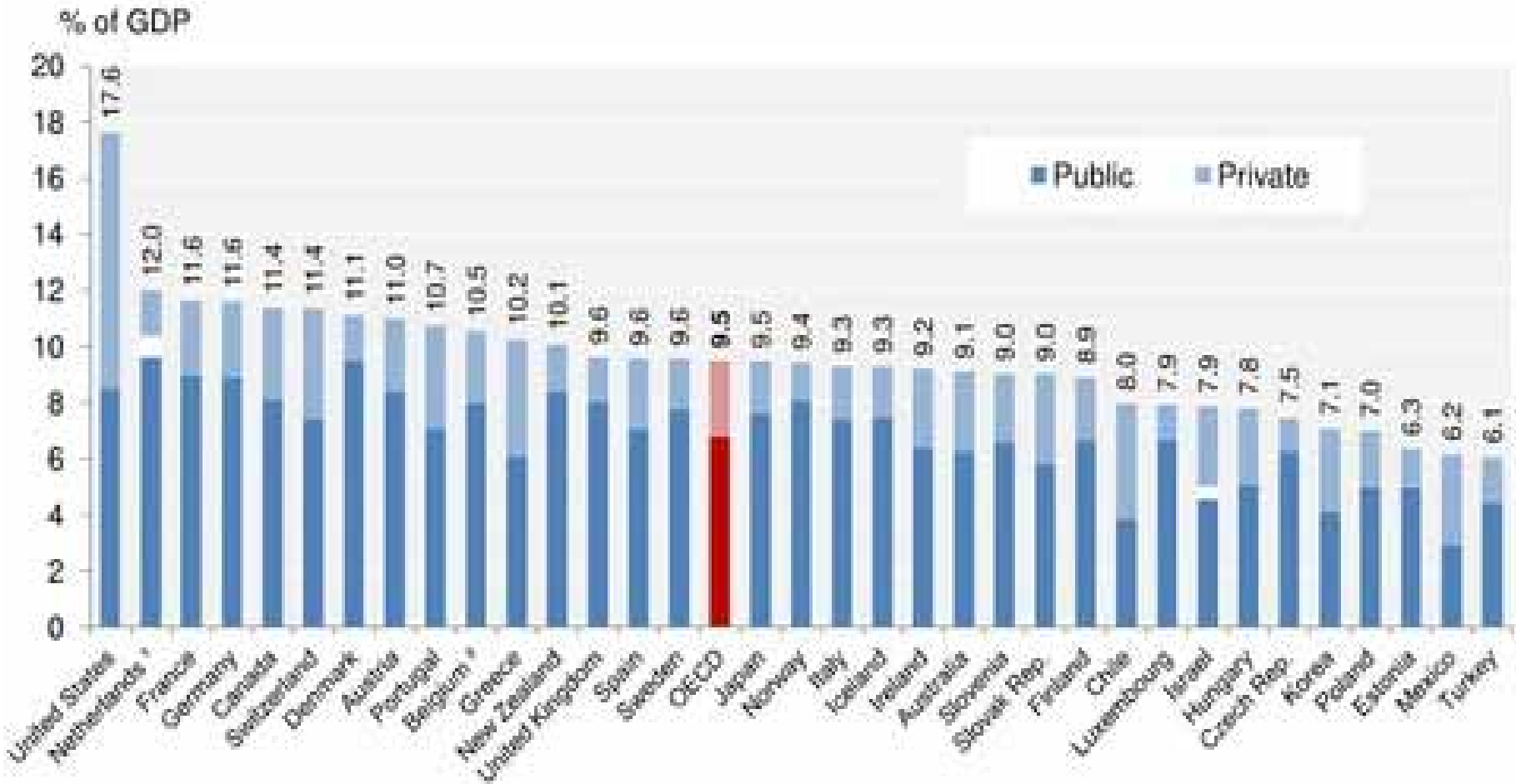
(OECD Healthcare Data Published 2012)

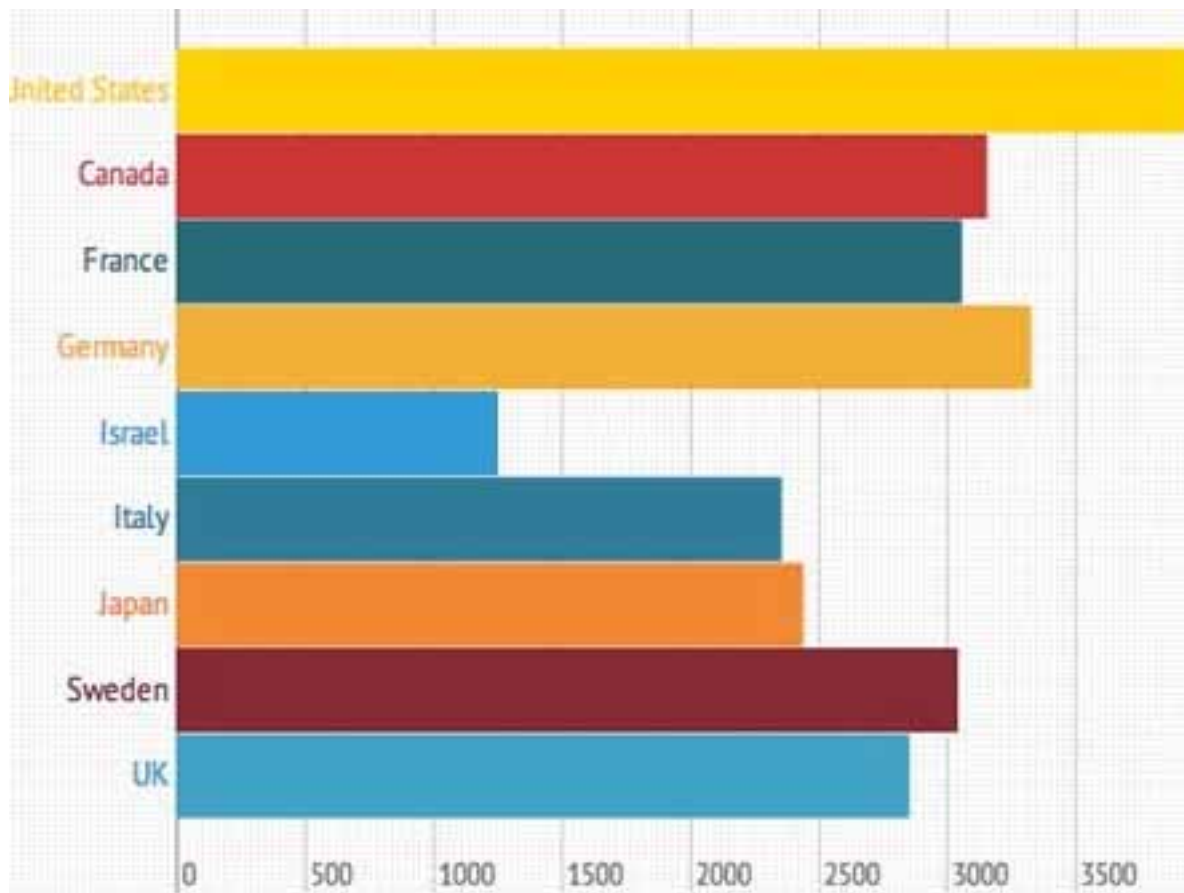# 1. Background Facts – Economic Indicators

Annual Expenditure Growth Rate Healthcare as 1993 – 2008

(OECD Healthcare Data Published 2012)

1. Background Fact – Economic Indicators

Per Capita Government Expenditure on Healthcare in US$ Adjusted for Purchasing Parity – 2010


(OECD Healthcare Data Published 2012)

1. Background Facts – Summary

➢US spends about *2½ times* more on healthcare than average of Organization for Economically Developed Countries (OECD)

➢US spends about 17.6% of GDP on healthcare about *2 times* of the average of OECD countries

➢US spends about *US$3 trillion more* on healthcare than next highest spender (Norway) in OECD

➢US expenditure on healthcare is steadily rising @ 3.1% per annum since 1993 about *0.8% less than* average of OECD

➢US spends about US$4,000 per person on healthcare which is about *US$1,500 more than* nearest national expenditure (Germany)

1. Background Facts – Summary

➤ In US for every $ spent on healthcare *only 21 cents* are directly for healing a patient

➤ In US for every $ spent on healthcare *79 cents* are spent on indirect, overhead and non-value added healthcare services and processes

➤ US healthcare system's Overall Resource Effectiveness (ORE) is about 21%
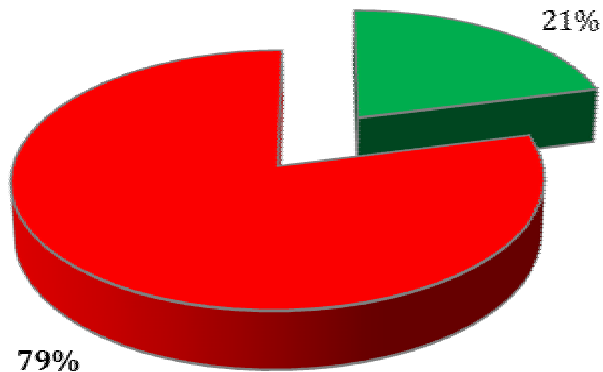
Financial Resource Utilization

21%

79%

■ Healing Patient   ■ Other Expenditures
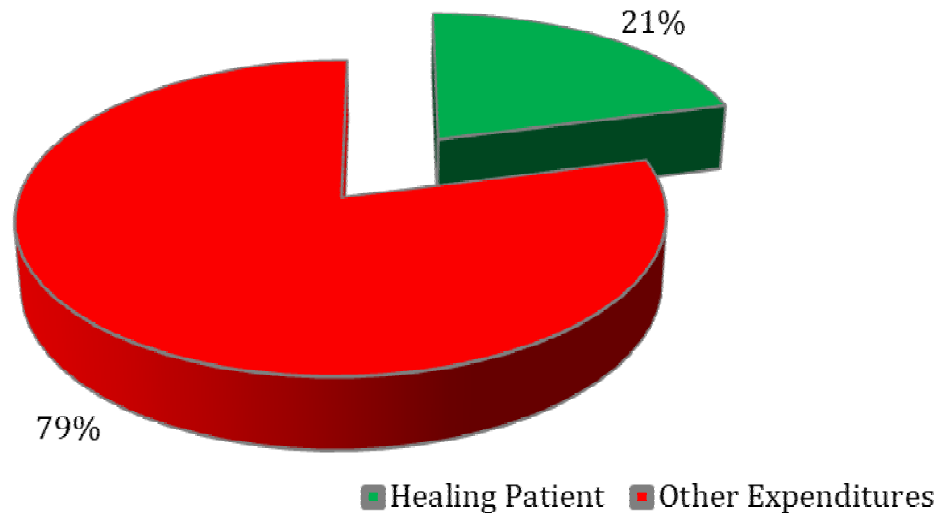
1. Background Facts – Strategy
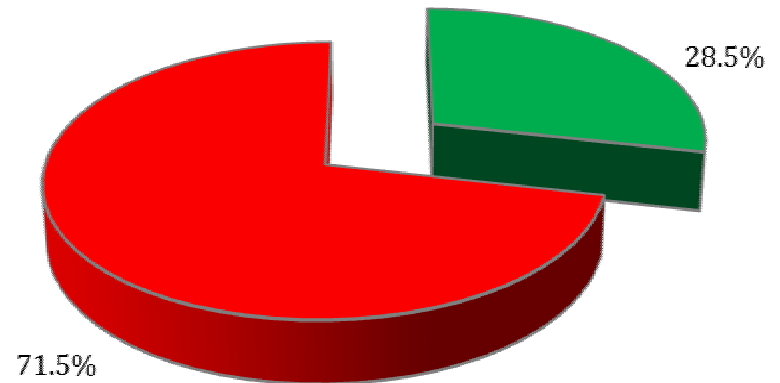
Present Financial Resource Utilization

21%

79%
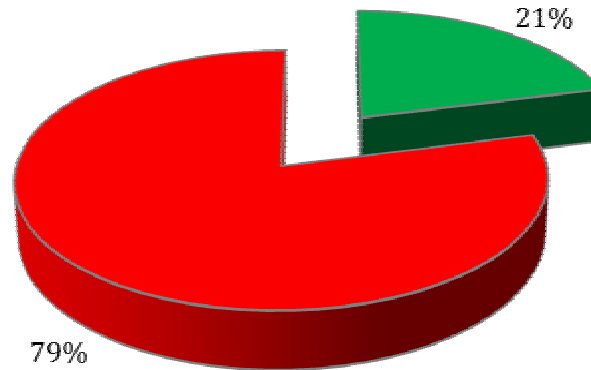
■ Healing Patient ($820 Billion)
■ Other Expenditures ($3.18 Trillion)

5 Years Future Picture - Option 1
(Increasing Expenditure by 3%/Year)

21%

79%

■ Healing Patient ($966 Billions)
■ Other Expenditures ($3.6 Trillion)

5 Years Future Picture - Option 2
(Improving Performance by 1.5%/Year)

28.5%

71.5%

■ Healing Patient ($1.14 Trillion)
■ Other Expenditures ($2.86 Trillion)

2. Sources of Study Data

Departments	Number	Patients	Departments	Number	Patients
Dental / Oral Surgery	7	6,751	Nuclear Medicine	2	56
Dermatology	6	3,212	OB/GYN	9	377
Emergency	9	21,677	Ophthalmology	7	1,814
ENT	6	1,263	Orthopedics	9	2,693
Family Practice	9	13,418	Pathology Lab	9	15,408
Gastro	6	873	Pediatrics	9	4,826
Labor & Delivery	9	255	Physical Therapy	9	1,203
Medical Services	9	4,509	Radiology	9	16,451
Mental Health	5	233	Urgent Care	9	27,615

1. Number of hospitals studied: 9 in continental US

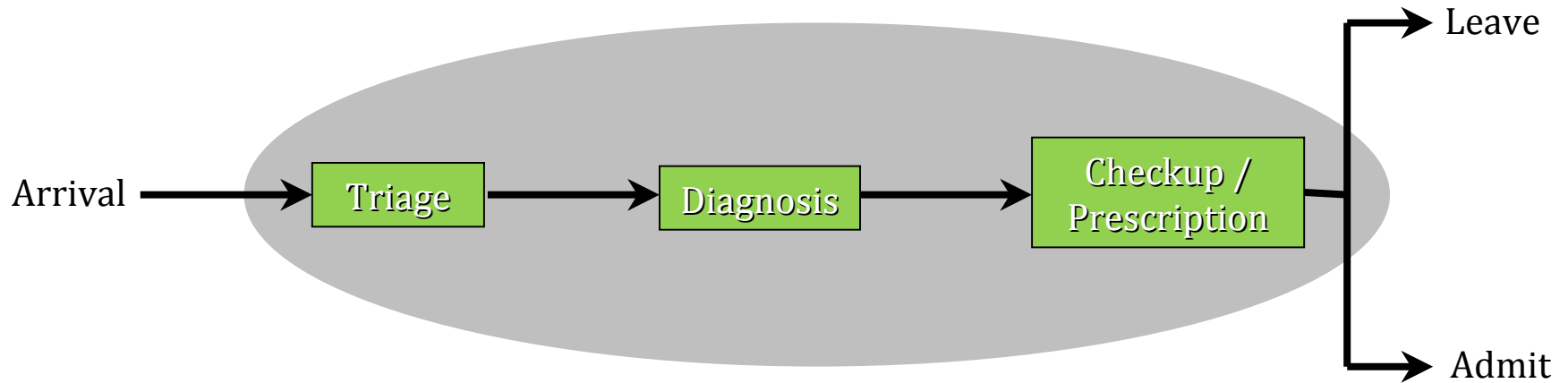2. Number of patients serviced: 58K ~ 147K annually; all ages and genders

3. ER means pre-treatment waiting areas in some cases

4. Rooms are the number within hospital population

5. Patients are people visiting the rooms in a week

3. Scope of Study

Generic Patient Value Stream – Flow through the system
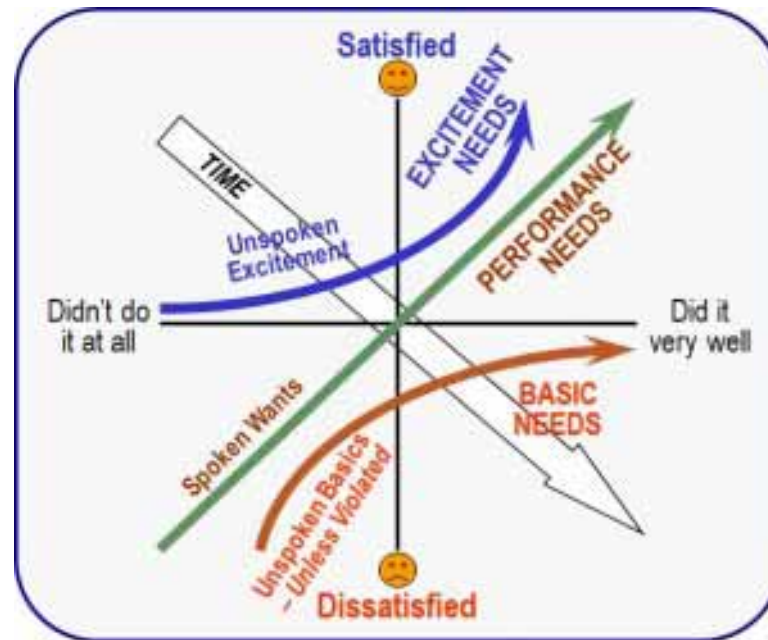
4. Defining Total Patient Experience (TPE)

QUESTION: What patient wants?

ANSWER: *Convalescence:* To get well – Single biggest goal

"But getting well is not a single point event *but* a process of *sequentially interconnected activities* through which patient has to go before getting well"

4. Defining Total Patient Experience (TPE)

"Total Patient Experience (TPE) is a balanced scorecard of all the required, basic, expected, implied needs; and unanticipated needs that bring excitement"

Source: Kano's model of customer satisfaction

4. Defining Total Patient Experience (TPE)

"Experience Vs. Feedback"

"Internal"
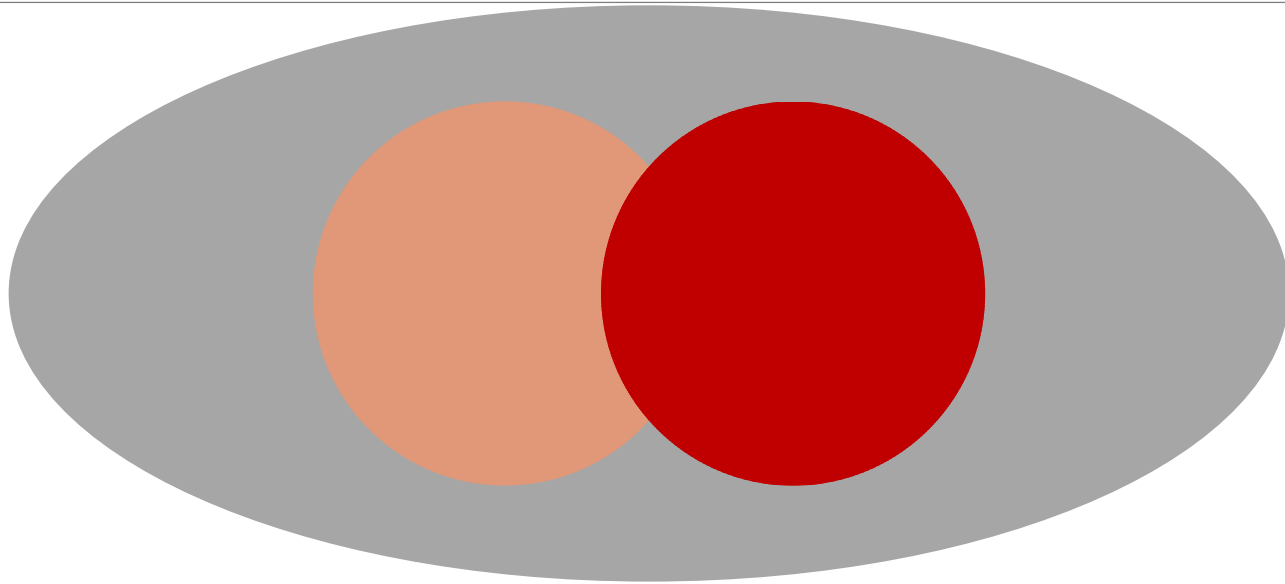
"External"

4. Defining Total Patient Experience (TPE)

"Total Patient Experience (TPE) is a balanced scorecard of all the required, basic, expected, implied needs; and unanticipated needs that bring excitement"

Critical to patient factors

➢ Time to heal

➢ Quality of treatment

➢ System Complexity

➢ Cost of healing

4. Defining Total Patient Experience (TPE)

a. Qualitative (Subjective):

-Perception
-Socio-Psychological factors
-Communication

b. Quantitative (Objective):

-Time
-Cost
-Quality of treatment

4a. Perception – The Art of Engineering

"We are just as good as our customers' perception...."
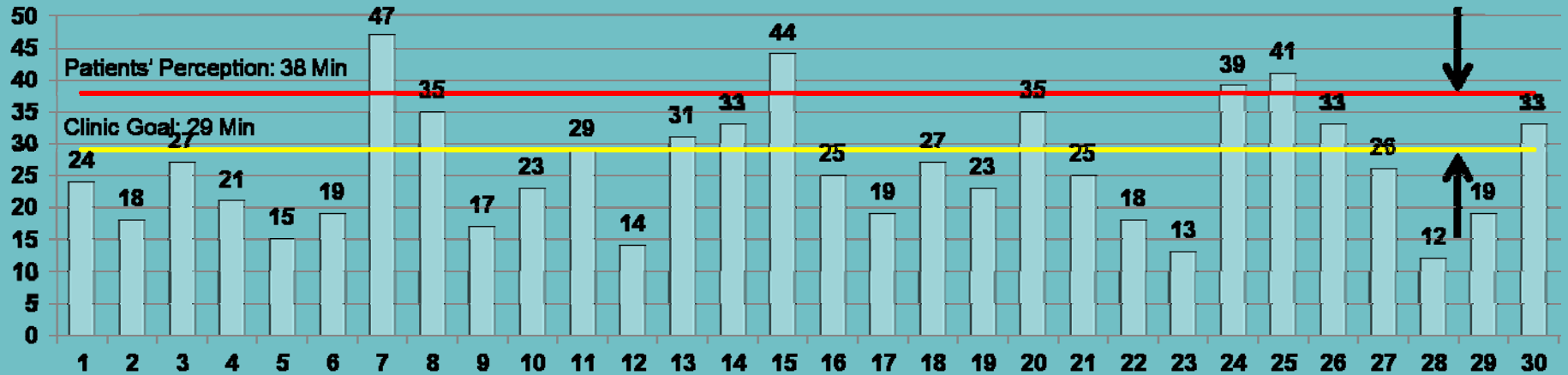
– Soichiro Honda, Founder of Honda Motor Company
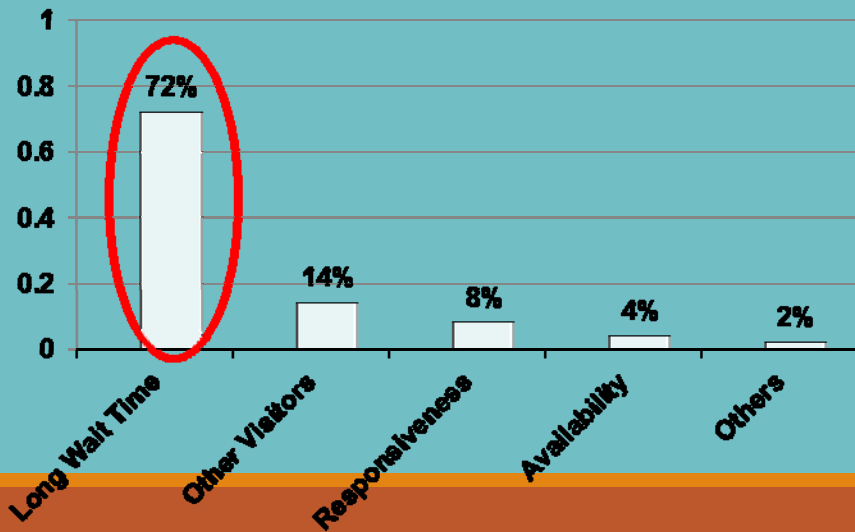
4a. Perception Vs. Reality in Wait Time

Level I, II & III Metrics (ER Case Study) – 5-Why Approach
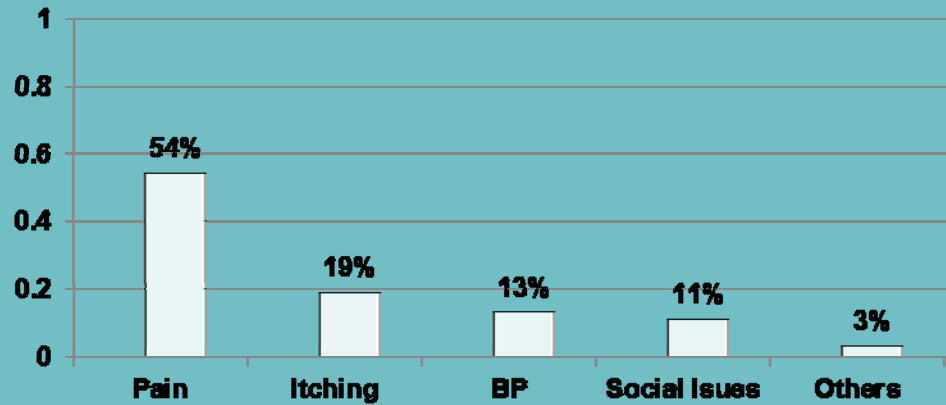
Wait Time Trend Chart (Min)

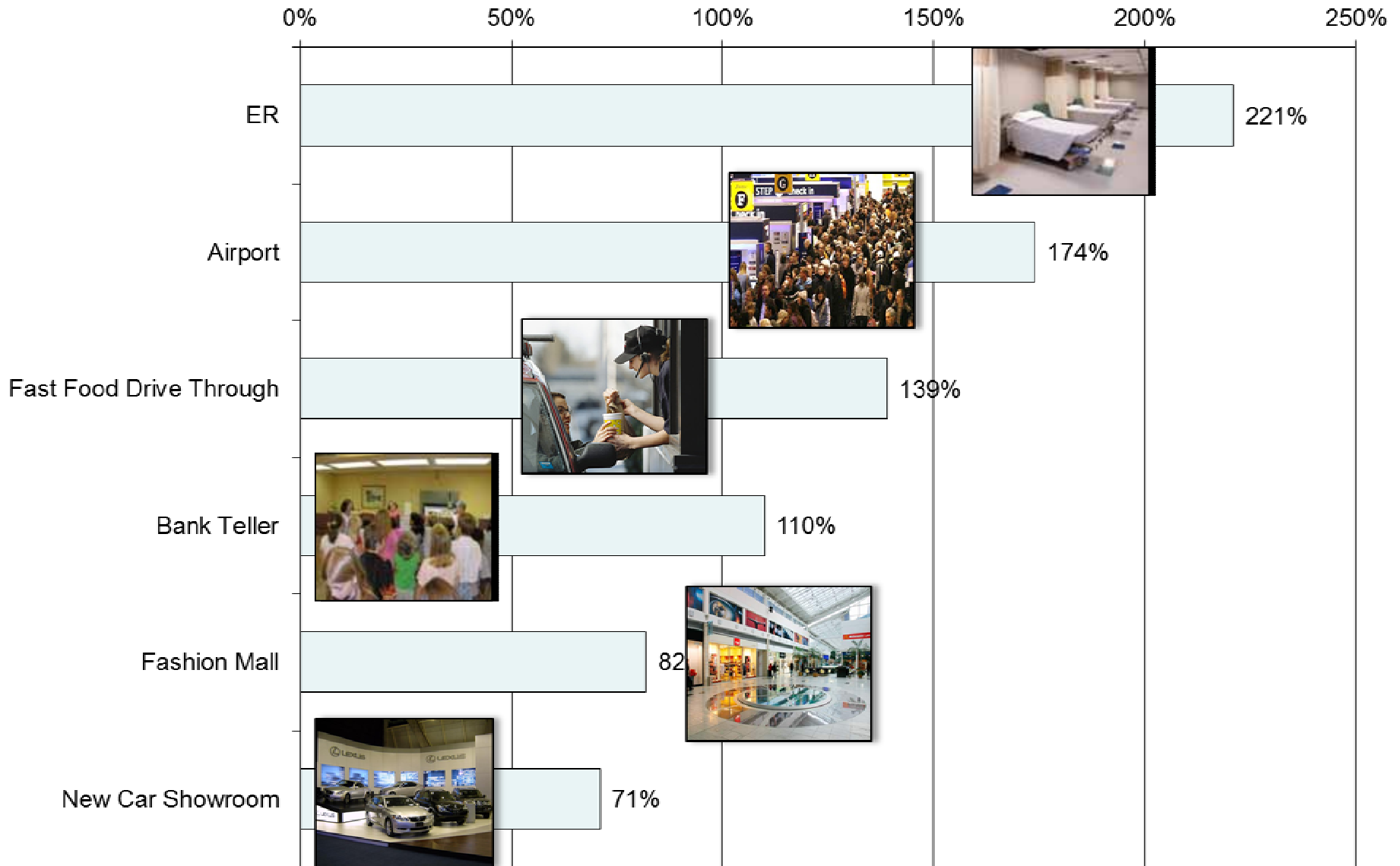**Perceptional Gap of Wait Time (9 Min / 31%)**

Patients' Perception: 38 Min

Clinic Goal: 29 Min

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 24 | 18 | 27 | 21 | 15 | 19 | 47 | 35 | 17 | 23 | 29 | 14 | 31 | 33 | 44 | 25 | 19 | 27 | 23 | 35 | 25 | 18 | 13 | 39 | 41 | 33 | 26 | 12 | 19 | 33 |

ER Concerns (Level II)

| Long Wait Time | Other Visitors | Responsiveness | Availability | Others |
| 72% | 14% | 8% | 4% | 2% |

ER Concerns (Level III)

| Pain | Itching | BP | Social Isues | Others |
| 54% | 19% | 13% | 11% | 3% |

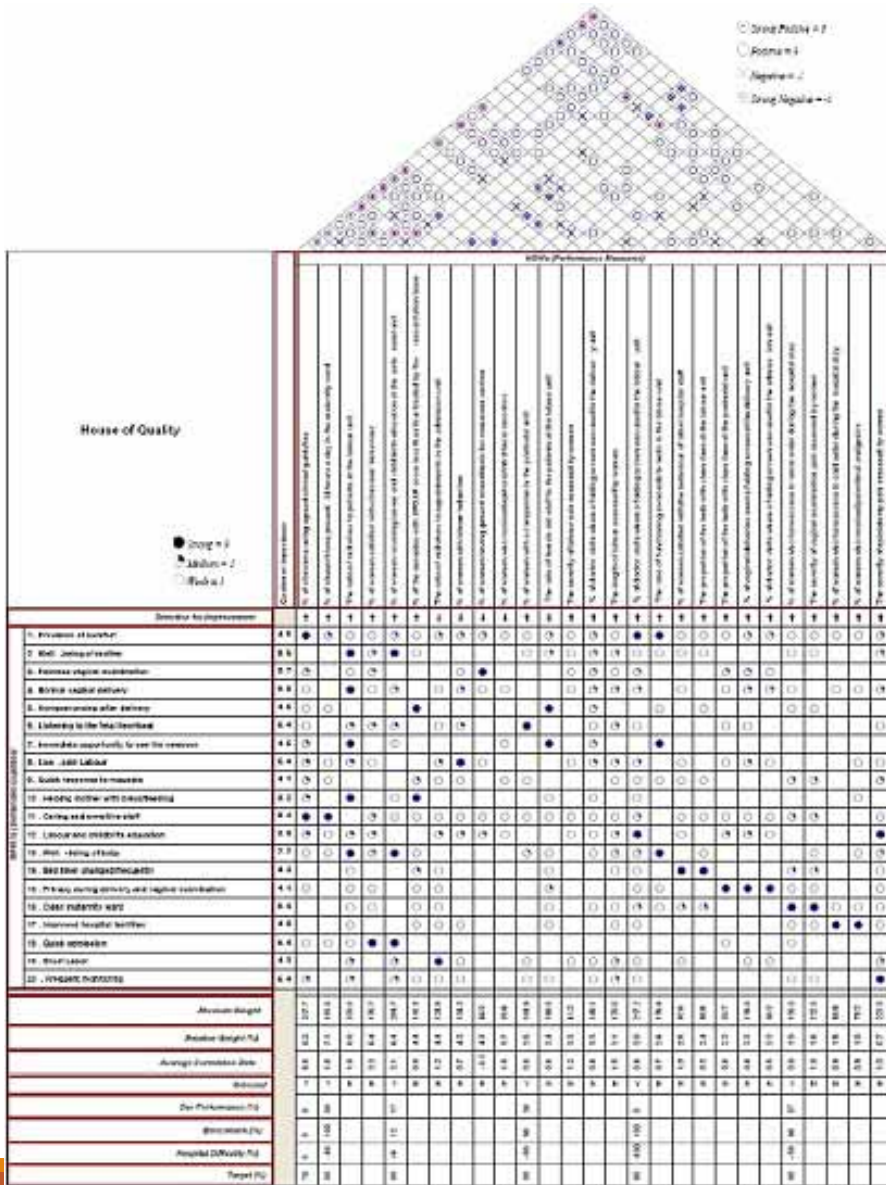# 4a. Time Perception is A State of Mind

4a. Qualitative Goals

"Setting internal goals higher than declared goals"

4a. Socio-Psychological Factors

"Understanding Voice of Patient – Creating Patient Centered Value"

4a. Scio-Psychological – Factors

"80% of feelings are *not or partially* verbalized
– Understanding *unspoken* value"

"*Gemba, Genchi, Genbutsu*
(Go see for yourself) exercise"

4a. Communication – Multiple Channels

Some facts:
◦ Patients are more informed
◦ Patients have more sources of information
◦ Patients demand more explanations

Effects of more information:
◦ Service time increasing
◦ Care in explaining sickness & treatment

Strategy for effective communication
◦ Breakdown in essential vs. non-essential
◦ Blogs and social media
◦ Use of consoling services
◦ More user friendly reading material
◦ Interactive kiosks

4b. Quantitative Scorecard – The Science of Engineering

Generic Patient Value Stream – Flow through the system
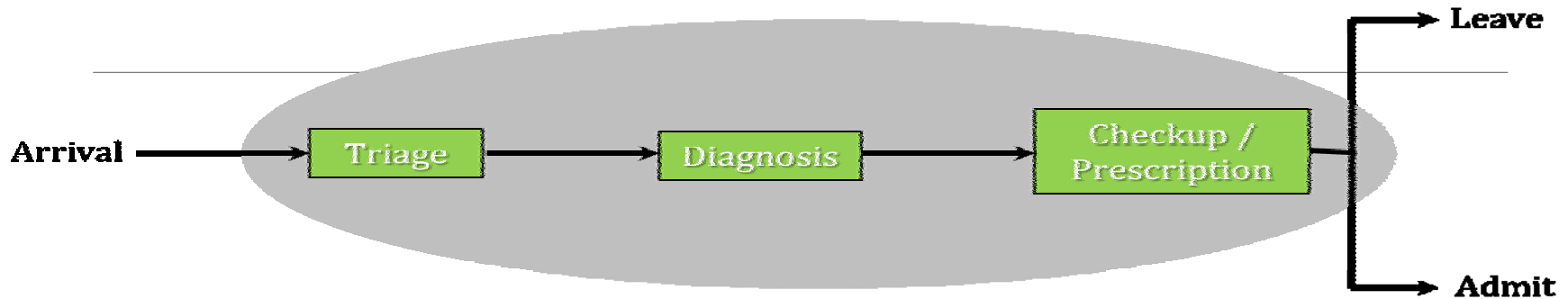
Patient Arrival	Triage	Length of Stay (LOS)	Discharge
KEY FACTORS	**KEY FACTORS**	**KEY FACTORS**	**KEY FACTORS**
Wait Time	Symptoms	Accuracy of Triage	Prescription
Info Entry	Accuracy	Accuracy of Diagnostics	Directions
Initial Care	Completeness	Quality of Care	Care / Precautions
Responsiveness	Understanding	Effectiveness of Treatment	Follow Up
	Attention	Rate of Recovery	

4b. TPE – Analyzing Time Variation

Overall workload trends by room locations, it was found:

- Consistent over time
- Variation in types of cases and proportional distribution
- Within ERs patterns were consistent

Condition classification

- Univariate Analysis of historical conditions
  - By diagnostics and ERs over time
  - By presenting conditions and ERs over time
  - Integrated ER physician expert opinion

Main Challenges

- Level of detail vs. manageability
- Diagnostics had major actionable potential but least manageable analytically
- Presenting conditions were more manageable *but* lose some level of detail

4b. TPE – Analyzing Time Variation

Providers by Categories	ER-1	ER-2	ER-3	ER-4	ER-5
Emergency Physician	158,005	68,818	106,591	192,369	164,916
Physician Assistant	1,677	47,933	22,517	89,251	47
Primary Care Nurse Practitioner – Qualified	25,929	21,443	172	2,867	94,969
General Medical Officer	1,769	38,615	1	28,237	2,902
Emergency Physician/Emergency Medical Services	7,574		6,749	6,608	10,044
Family Practice Physician	61	7,923	12,976	63	1,175
Primary Care Nurse Practitioner – Entry		1,725	397		19,535
Corpsman/Technician	112	12	2	8,694	66
Ob/Gyn Nurse Practitioner					7,236
Emergency Physician Resident/Intern With License	1,517			920	4,628
Nurse, General Duty	1,798	519	2	1,371	290
Internal Medicine Resident/Intern Without License				1,301	1,409
Emergency Physician Resident/Intern Without License				1,679	19
Family Practice Physician Resident/Intern Without License	258	255	71	7	197
Radiologist	740				
Family Practice Physician Resident/Intern With License	510	31			
Internal Medicine Resident/Intern With License					349
Obstetrician and Gynecologist (Ob/Gyn)	3		1	2	332
Hyperbaric/Undersea Physician				310	
Surgery Resident/Intern Without License				14	276
Corpsman, Independent Duty	168		19	36	2
Internist	1	14		3	95
Pediatric Resident/Intern Without License				20	82
Ob/Gyn Resident/Intern With License					96
Physical Therapist	2		18	5	37
Pediatric Nurse Practitioner		45			
Pediatrician	10	24	2	5	3

4b. TPE – Defining Presenting Conditions

Defining Presenting Conditions – Options:

- Based on free text Chief Complaint field
- Based on coded ICD9 of Chief Complaint field
- Based on coded ICD9 of Primary Diagnostic assessed post diagnosis and treatment
- Based on groupings of related ICD9s (e.g., AHRQ Condition Classification Software (CCS) categories), or
- Based on expert opinion of operationally similar conditions in terms of treatment flow, patterns, and requirements

4b. TPE – Defining Presenting Conditions

Physicians and Nurse Practitioners(NP)/Physician Assistants (PA) overseeing given cases comprised 96.7% of the ER workload

◦ Physicians 68.5%

◦ NP's/PA's 28.2%

◦ Residents (as appointment provider) 0.7%

◦ RNs 1.6%

◦ Unknowns 1.1%

Substantial and significant variation between physician and NP/PA providers, for the same presenting condition, across condition groups

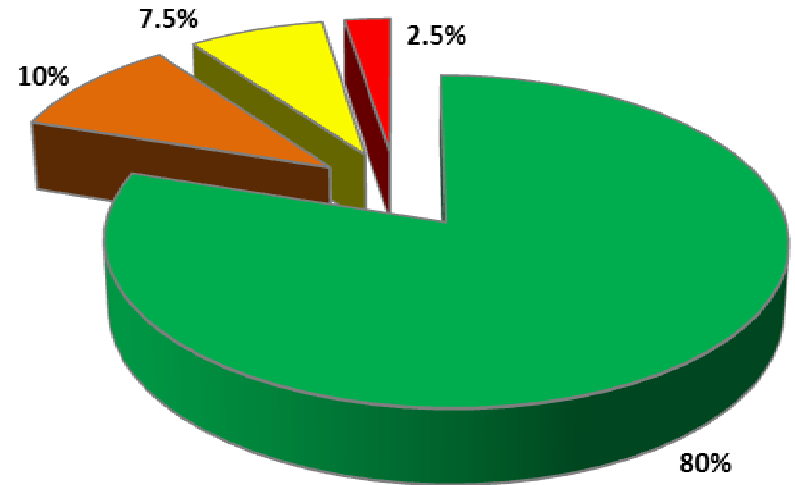Only a few conditions had similar variance and LOS expectation for both Physician and NP/PA provider skill sets

4b. TPE – Value Streaming Work Content

Never Standardize before Value Streaming
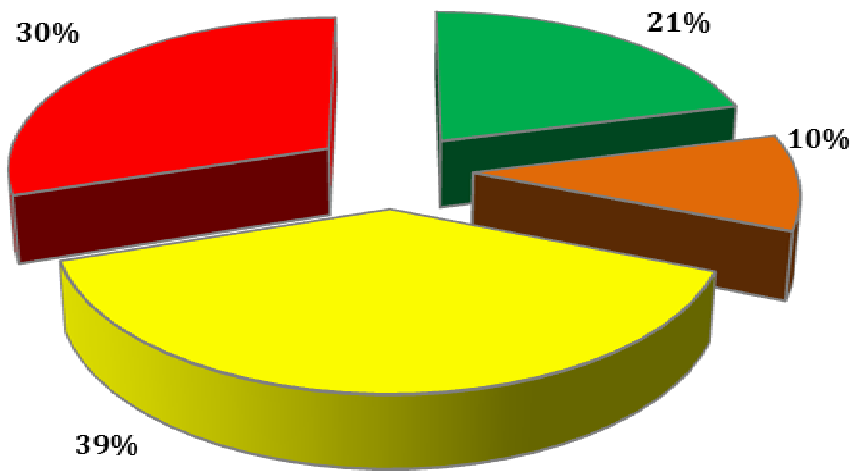
4b. TPE – Value Streaming Mapping Template
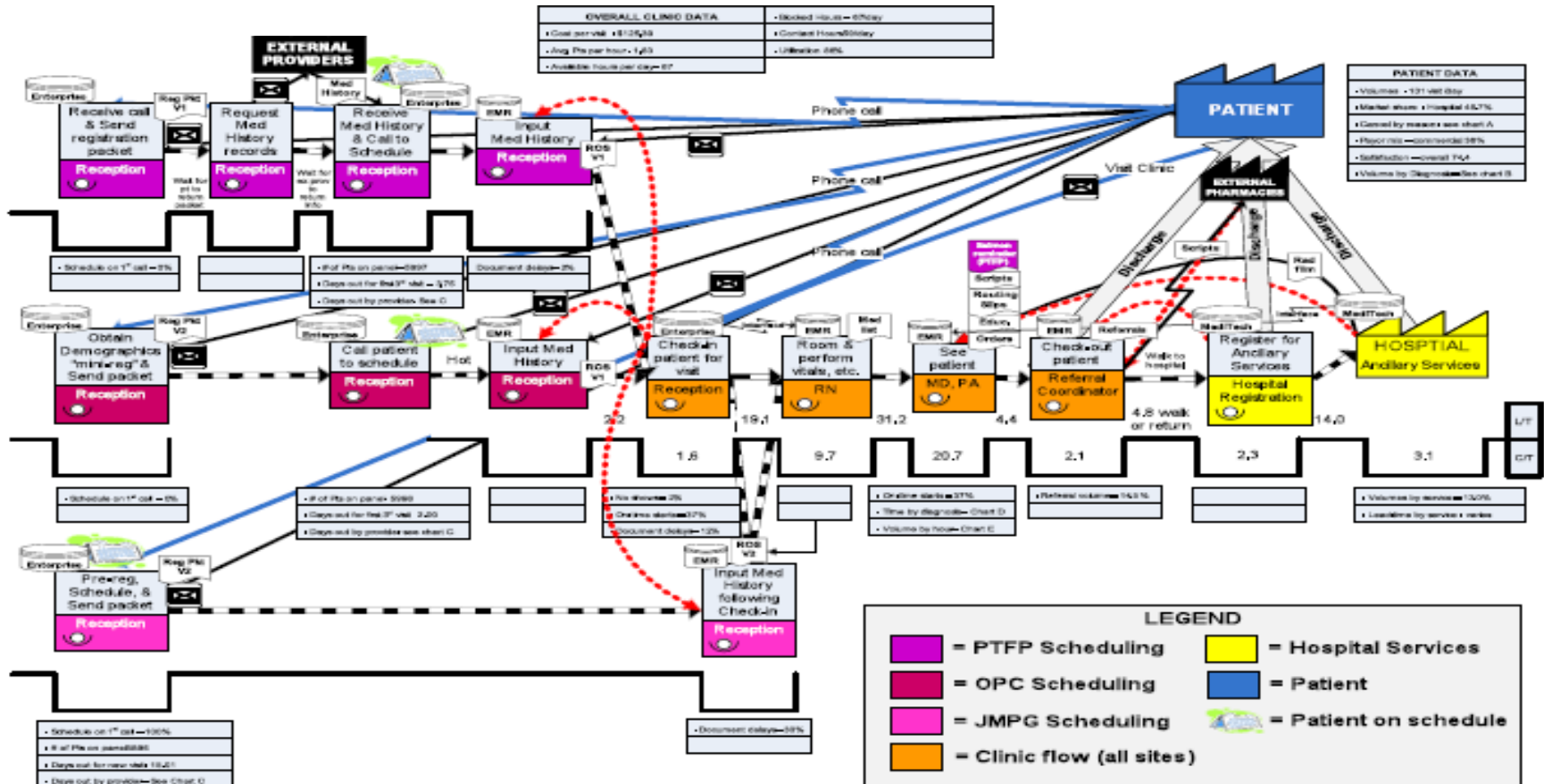
# 4b. TPE – Quality of Service by Mistake Proofing

Basic characteristics of error proofing:

- The only way is the *right* way

- Is minimum *100% reliable*

- Has multiple *layers of protection*

Relative Mistake-Proofing Power	Effect	Trigger
10 HIGH	Forced Control	Automatic & Compulsory
9	↓	
8		
7	Shutdown	
6	↓	
5		
4	Warning	Operator Dependent & Discretionary
3	↓	
2		
1	Sensory Alert	
0 LOW	↓	↓

4b. TPE – Quality of Service by Mistake Proofing

"Poke Yoke – *Eliminating* possibility of making errors"
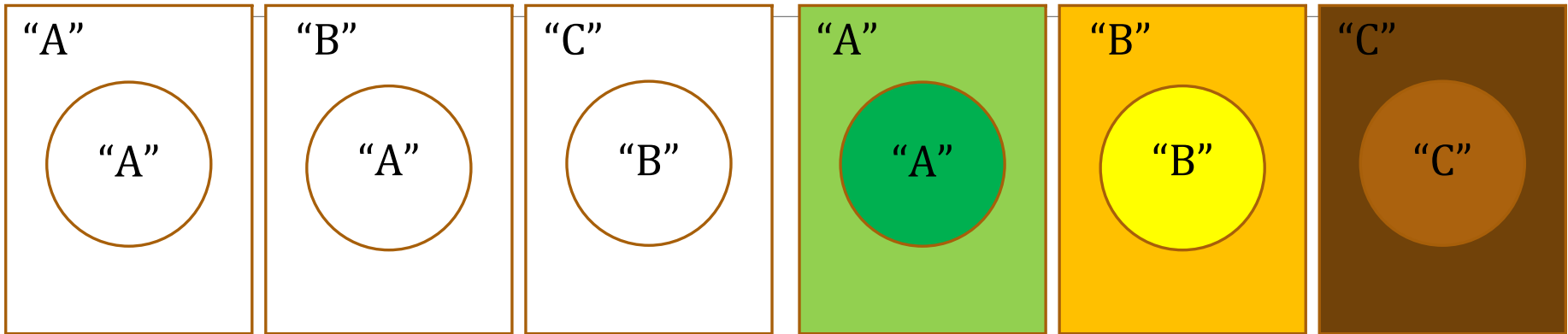
"Visual controls are *not Poke Yokes*"
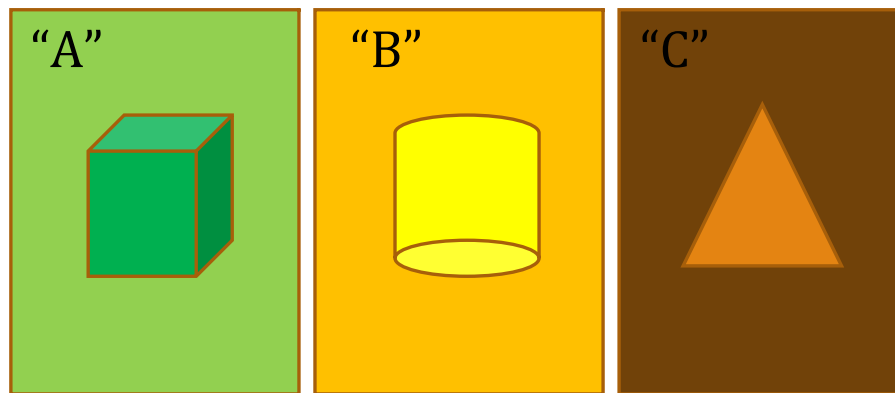
5. Applying Lean Tools

Not all lean tools are *effective* for every problem

What needs to be done?	Useful Lean Tool	Scope of Tool
Strategic Planning	Hoshin Kanri / A3	Strategic
Waste Elimination	Value Stream Mapping	Operational
Variation Reduction	Standardized Work	Operational
Variation Reduction	Stadardized Setup	Operational
Productivity Improvement	OEE / TPM	Operational
Root Cause Analysis	Fishbone / Ishikawa	Tactical
Stock Control	Kanban / Just In Time (JIT)	Operational
Avoiding Mistakes	Visual Controls	Tactical
Avoiding Mistakes	Poke Yoke	Tactical
Understanding Customer Expectations	Quality Function Deployment	Strategic
Understanding Customer Expectations	Kano's Model	Strategic

6. Conclusions:

➢Predictive Medical Scorecards must have strong customer focus

➢Patient / Client defines real value of a product or service

➢Not all expectations are verbalized

➢All core patient care processes require periodic value streaming

➢Single biggest element of quality of care is the occurrence of mistakes

➢Mistake proofing is a systematic process to be effective with multiple layers of protection

References

Free Template Websites
◦ For QFD:

http://www.qfdonline.com/templates/

http://www.free-power-point-templates.com/articles/free-house-of-quality-template-for-powerpoint-qfd-template/

http://www.databison.com/house-of-quality-template-in-excel/

◦ For Value Stream Mapping:
http://www.qimacros.com/quality-tools/value-stream-map/

http://www.lean.org/common/display/?o=866

http://www.iieet2.org/SHS/Details.aspx?id=18984

◦ For OEE:
https://leanexecution.wordpress.com/free-oee-templates/

http://www.isixsigma.com/topic/oee-hourly-calculation/

Questions / Comments?