

## **M1: Taming the Tail of the Dragon: Our Experience in Acute Care Flow**



### **Using a Diagnostic Tool to Understand Hospital Flow**

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Kirk Jensen MD, MBA

Chair, IHI Patient Flow Innovation Community

Vice President of Clinical Operations, BestPractices

The Work of the IHI Innovation Team and Patient Flow  
Innovation Community

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### **Our Current Approach to the Problem**

- “Blind” improvement projects (affect of discharge appointments)
- Squeaky unit or physician group
- Persuasive faculty (smooth elective surgical admissions)
- Assumption of more demand than capacity (building more beds)

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### Desired Outcomes

- Increased throughput (more patients being moved through the hospital)
- Decreased resource use (fewer beds being staffed and used for the same number of patients)
- Highest revenue per bed turn possible
- Maintain or improve our current level of quality

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### How Do We Decide How To Use Our Resources to Improve Flow

- Table Exercise  
How have you picked your flow improvement projects?

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### Levels of Diagnostic Viewing

- Patient and Community
- Hospital Throughput
- Hospital Activity
- Hospital Performance

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### Patient and Community

- Patient and community satisfaction with our hospital's service availability
- This metric is universally missing
- If interpreted it is commonly from the hospital's point of view

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### Hospital Throughput

- Bed turns (unadjusted)  
(Admissions + observations) divided by functional beds

Example: 10,000 admissions + 1000 Observations and 200 functional beds  
=55 Turns

- Bed turns (adjusted)  
(Admissions x case mix index + observations) divided by functional beds

Revenue/bed

Total revenue from admissions divided by functional beds

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### Hospital Activity

#### Utilization of beds

Defined as the ratio of the actual bed turns to theoretic bed turns

Utilization of beds=Turns (unadjusted) divided by theoretic bed turns

Theoretic bed turns=365 divided by LOS

Example 55 Turns with LOS of 4 days=  $365/4=91$   
 $55/91=60\%$  utilization of beds

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### Flow Diagnostic Key Metrics- A Summary

Unadjusted turns = (Admissions + Outpt in inpt beds) / Functional Beds

Adjusted turns = [(Admissions x CMI) + Outpt in inpt beds] / Functional Beds

Potential turns = 365 / LOS

Utilization = Unadjusted Turns / Potential Turns

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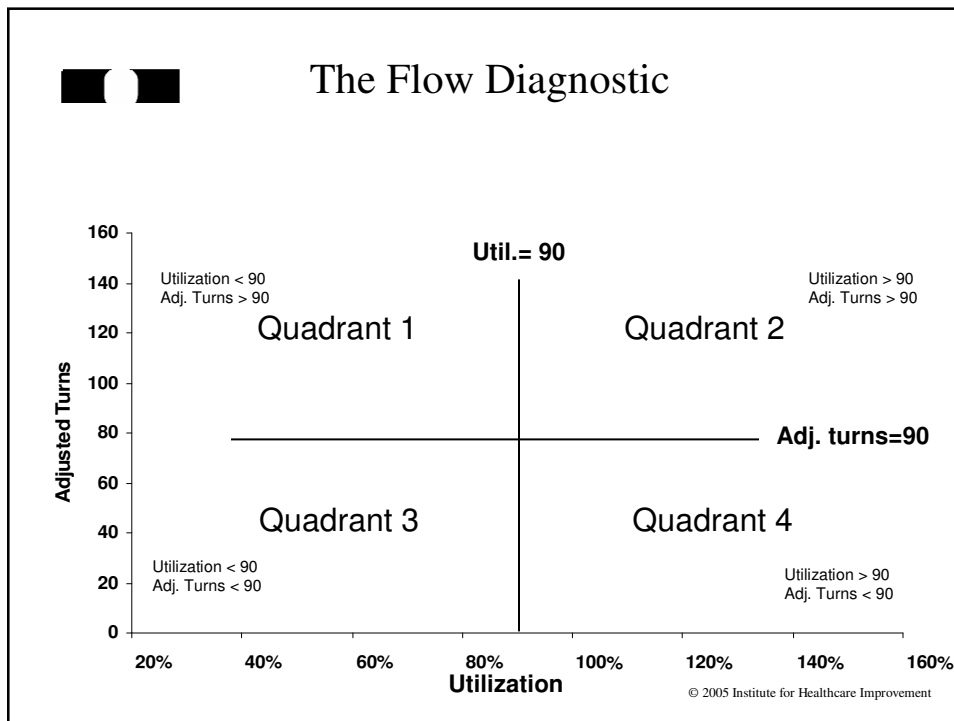
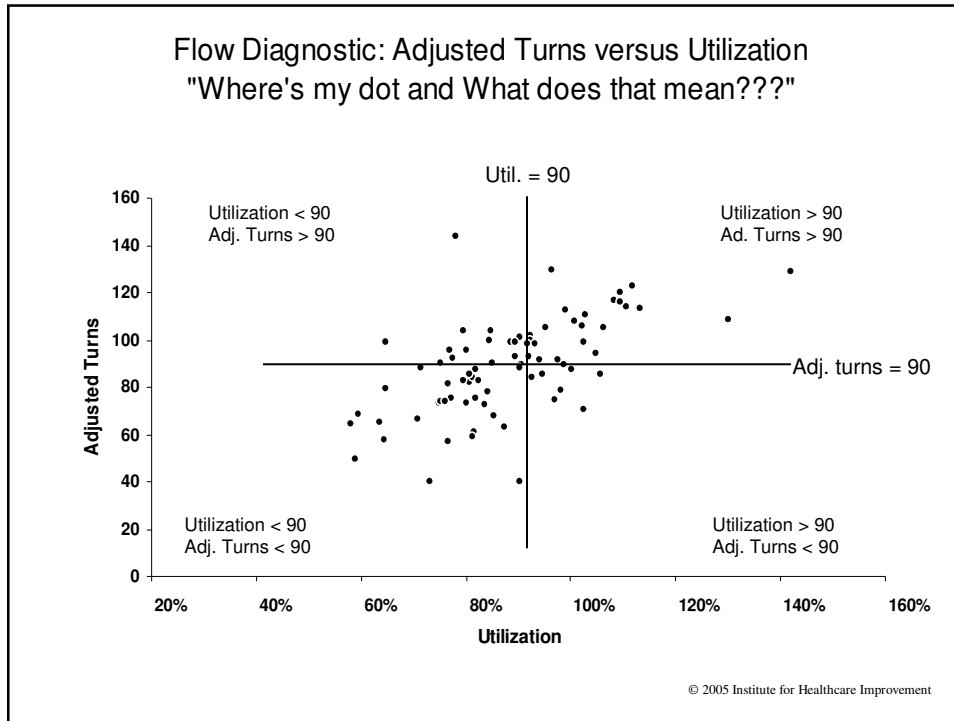


### Hospital Performance

- ED to floor
- PACU to floor
- ICU to floor
- Boarders-ICU, PACU, ED percent of capacity wasted to boarders (patients waiting to be transferred is a surrogate for waiting times)
- LOS for nursing home patients
- Percent of patients LWBS from ED
- Percent of time on diversion/ number of diversions

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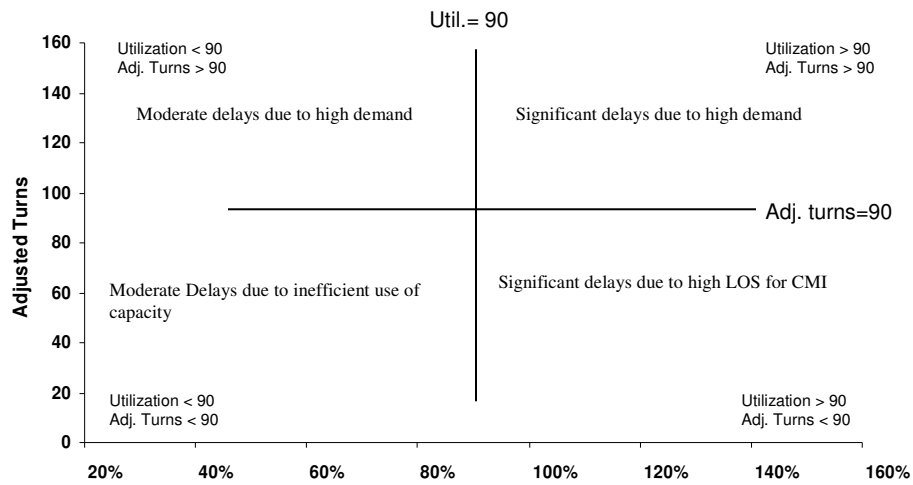
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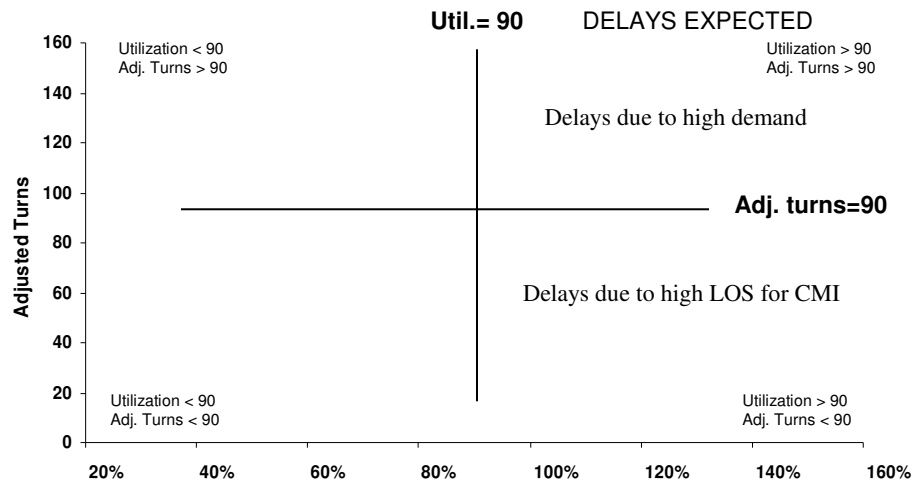
## What Changes and Why: Understanding Delays from the Flow Diagnostic



Let's focus on Quadrants 2 and 3...

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### Understanding Delays from the Flow Diagnostic



Utilization > 90, Adj. Turns > 90

### Reducing Delays

1. Since utilization is high, can LOS be reduced?  
(See Strategies for decreasing LOS for Quadrant 4 on next slide)
2. Since utilization and turns are high, is there an obvious mismatch between capacity and demand? Does capacity need to be added?
3. Since demand is high, existing capacity must be optimized  
(Effective Administrative System is critical, discharge appointments and synchronization, collaboration with nursing homes, smoothing, flexing, etc.)

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Utilization > 90, Adj. Turns < 90

### Reducing Delays

Use strategies to decrease LOS

- Use multidisciplinary rounds in units other than the ICU
- Reduce adverse events
- Optimize staffing ratios
- Predict and plan for admissions to extended care facilities
- Adhere to utilization criteria for specialty beds
  - (i.e. Telemetry, ICU, PACU)
- Conduct preadmission planning for elective surgery
- Reduce variation (ie: elective surgical variation)

*\*Might focus on conditions that have a long LOS compared to other hospitals*

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Let's pause here and talk things over...

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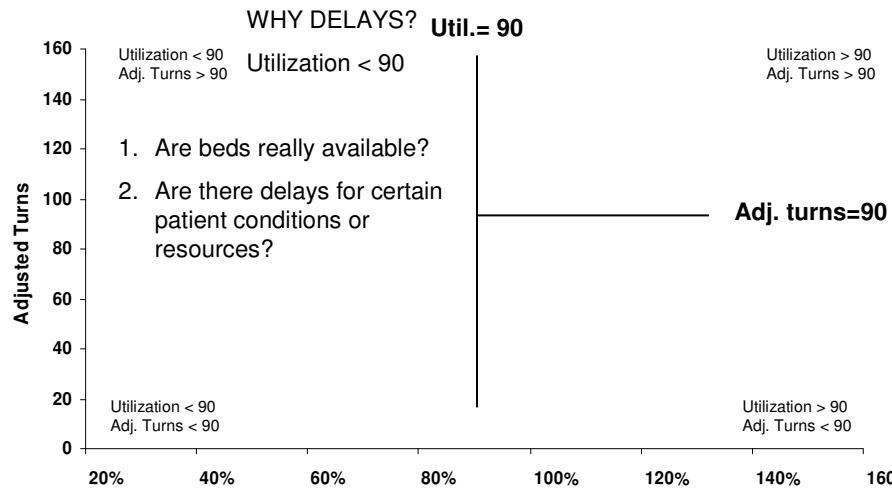
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What about quadrants 1 and 4?

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## Understanding Delays from the Flow Diagnostic



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### 1. Are Beds Really Available?

- If yes, determine whether the reasons for the delays are within the ED or from the ED to the units
- If no, recapture wasted capacity

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### Example – St Elsewhere Hospital

- Adjusted turns = 70, Utilization = 84%
- Delays: Median time ED to floor > 2 hours  
On divert about 40 hours a month
- Beds are available

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Yes, beds are available but .....

Delays exist within the ED, for example:

-Waiting for admitting MD (orders)

- Waiting for value-added tests
- Variation in Demand (Make into direct admits)

Delays exist from ED to the floor, for example:

-ER Nurse and tech unavailable to take patients upstairs

- (or transporter problems)
- Admission delays
- Nurses on the floor are unavailable

Go to the ED to understand the sources of delays

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Beds are available but there are delays, either  
diversions or delays in door to floor...

- Go to the ED and look around
- Talk to the people doing the work
- The selective use of data
- Do a pareto analysis
- Flow chart the problem processes
- Pull together an expert panel/focus group
- Get to work fixing the problems

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### 1. Are Beds Really Available?

If No, Some potential sources of wasted capacity

- Bed holds
- Inefficient room/bed cleaning and turnaround
- Internal transfers

*Use Wasted Bed Capacity measurement tool to verify utilization and better understand sources of wasted capacity*

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### Wasted Capacity Measurement Tool

#### Good Use of Capacity

- 1-Bed has a patient currently getting care
- 2-Bed has patient with discharge in process

#### Bad Use of Capacity

- 3-Bed has patient with completed discharge waiting to go
- 4-Bed needs to be cleaned or is in process of being cleaned
- 5-Bed held for surgical patient
- 6-Bed held for admission or transfer
- 7-Bed contains a body
- 8-Bed empty for other reasons (equipment failure, decontamination, etc)

#### Available Capacity

- 9-Bed empty but no demand and unused today

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### 2. Are There Delays for Certain Patient Conditions or Resources?

- Collect data to identify a stream (or two) of patients (e.g. cardiac) that are a high percentage of ED holds for admission (at least 20%) or delays from the PACU.
- If the data collection shows a particular unit (e.g. telemetry) is a bottleneck, then focus on a high volume stream of patients that go through that unit.
- Once a stream of patients is identified, develop a flowchart for the flow of patients in that stream and conducting a bottleneck analysis to determine the interventions needed.

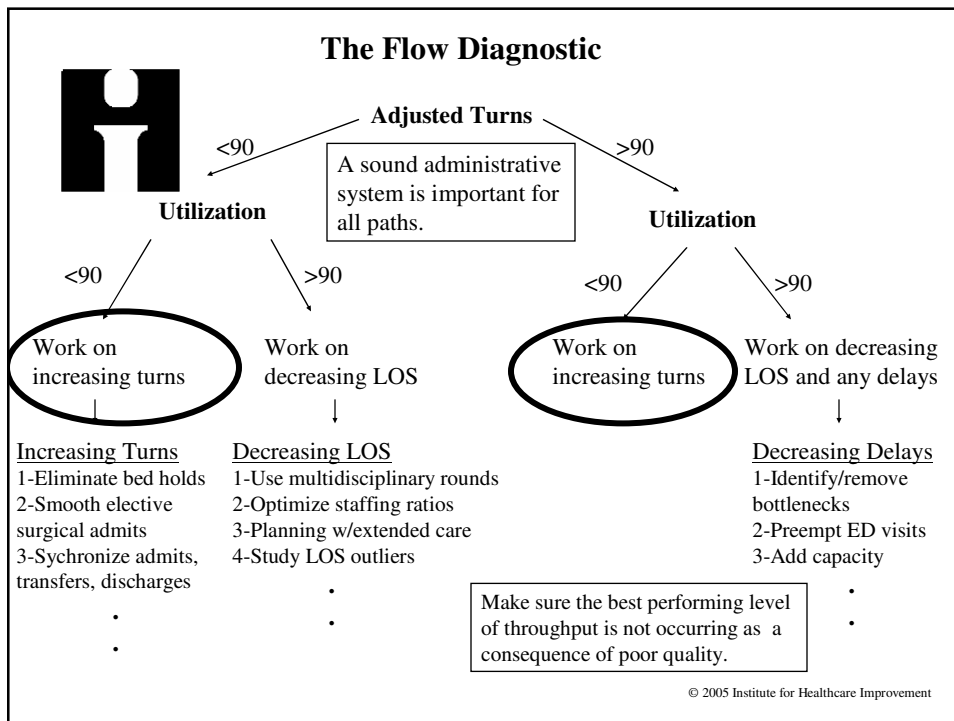
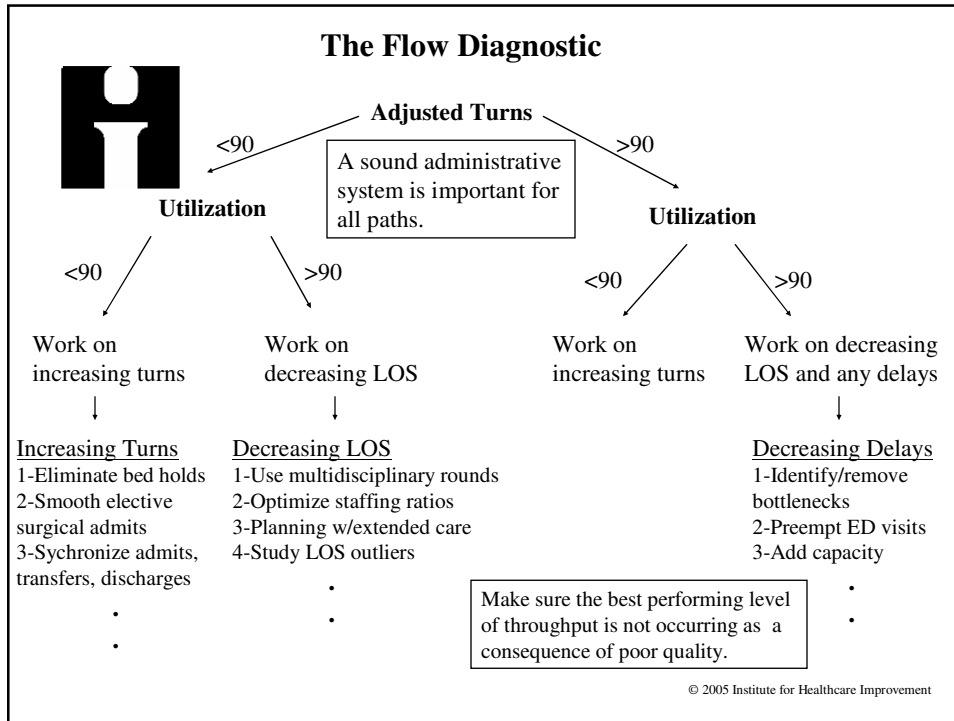
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Another view of the flow diagnostic

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### Change Concepts: Strategies for increasing turns

- Eliminate bed holds (ie: holding a patient to be admitted post surgery)
- Smooth elective surgery (decreasing variation)
- Synchronize admissions, transfers, and discharges
- Use an early warning and response system for large fluctuations in demand or capacity
- Develop a room/bed cleaning and turnaround strategy
- Reduce off service patients (outpatients in inpatients beds)
- Utilize acuity adaptable beds

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#### **A Real Hospital-Let's do the math:**

Admissions 16,704 with 4,246 observations.

Case mix index of 1.49. LOS 4.7

Average functional staffed beds 432

Unadjusted Turns= $\text{Adm} + \text{Obs} / \text{functional beds} = 48$  Turns

Adjusted Turns= $\text{Adm}/\text{beds} \times \text{CaseMix} + \text{Obs}/\text{functional beds} = 67$  Turns

Theoretic Turns= $365/\text{LOS} = 77$  Turns

Hospital efficiency= $\text{Adjusted Turns}/\text{Theoretic} = 74\%$

#### **Key Facts:**

High performing hospitals have 90 or more adjusted turns and an efficiency of 90%

In the "bucket" unadjusted turns best (89 turns)

Average revenue (actual collections) from an admission = \$7,525

Increasing by 10 turns only = \$32,000,000

Increasing to high performing hospitals (89 turns) = \$60,000,000

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### The Rules

- Three considerations must be balanced.
  - Throughput with turns,
  - Hospital efficiency
  - Quality
- The diagnostic will allow the focus of energy at the right level
- The diagnostic can be used to find where your hospital can learn
- The object is not to get lost in the data, but to focus your resources to make the maximum impact

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### Why is Achieving Excellence in Patient Flow So Difficult?

- Flow is a complex technical problem
- Flow cannot be solved by one department
- The solution requires high levels of cooperation and integration
- The solution cannot be installed. Success requires effective diagnosis of the problems and effective testing of the changes using multiple PDSA cycles.

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## Next Steps for You

- Run the simple diagnostic for your hospital
- Place your hospital in one of the buckets if you would like some comparison
- Determine whether you are putting your resources in the right place
- Get specific information on change concepts from the site [www.ihl.org](http://www.ihl.org)