Lean And Six-Sigma With Workload Data

Goal

Give to patients;
Exactly what they need;
When they need it;
Every time;
Defect free;
In a safe environment;
At the lowest cost;
Without waste.

Objectives

- Understand how the elements of Lean technology can be used to improve patient care and patient outcomes
- Describe the role of workers in Lean simulation models
- Identify sources of information for potential study using Lean and workers
- Understand how Lean and workers were able to address patient relations issues using medical coding technology

"Lean" Methodology (TPS)

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A bit more about "Lean"

- Analysis of "waste"
  - Time on hand (waiting)
  - Transportation (moving stuff around)
  - Processing (making work flow)
  - Movement
  - "do overs"
- Understanding the work
- Pull, why, sometimes

Why Hospitals are moving to TPS

- Improve patient outcome(s)
- Decrease cost
- Respond to increase demand
- Enhance patient safety with chronic disease
- Address technology implementation processes and barriers
- Address prevention and early detection of chronic care

Where to begin?

- Problem statement
  - Keywords
  - Context (actors and stakeholders)
- Suggestions from staff
- Suggestion from users
- Observations
- Outcome data

Nursing Practice Time

Source: JONA Vol 39, No 6, June 2009

Note: 36 hours 41 minutes in 1 health care system and 1 state

Source: JONA Vol 39, No 6, June 2009

Work

Waiting

Looking/receiving

Delivering

Non-clinical

Personal time

Patient/family care

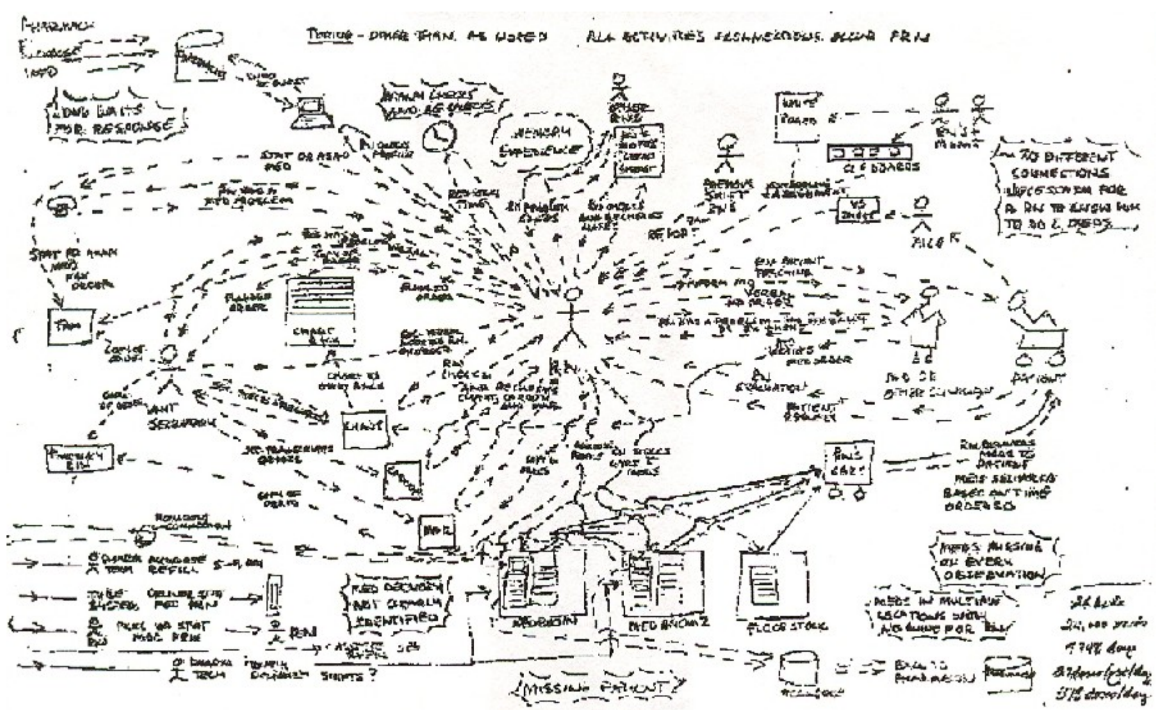
Administration/teaching

Processing Information

- Human information processing deals with how people receive, store, integrate, retrieve and use information
- Capacity is about 5-7 chunks of discrete information
- Bottlenecks occur and storage is an issue
- The human capacity to interpret accurately the structure and dynamics of complex systems is grossly overestimated

Complexity
(Multiple States)

Example: Medication Administration



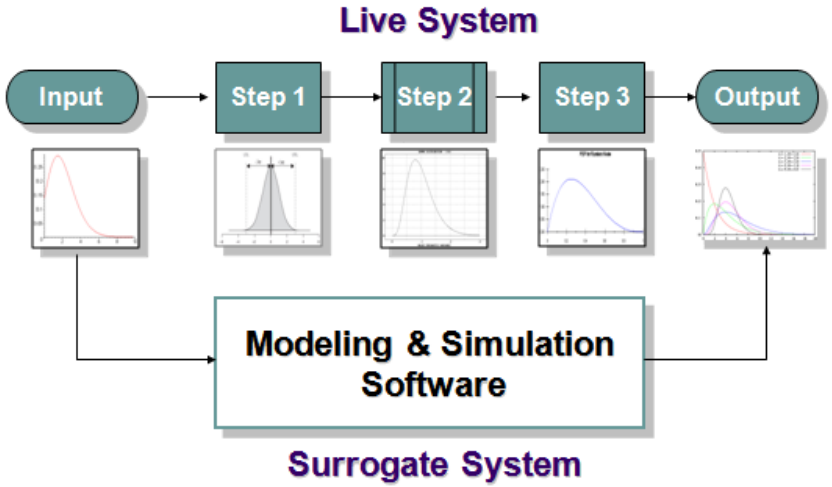
Complex systems are multi-dimensional!

From: "Driving Improvement in Patient Care"

Enablers

What → Visit interesting examples of an existing system

Computational Modeling and Simulation



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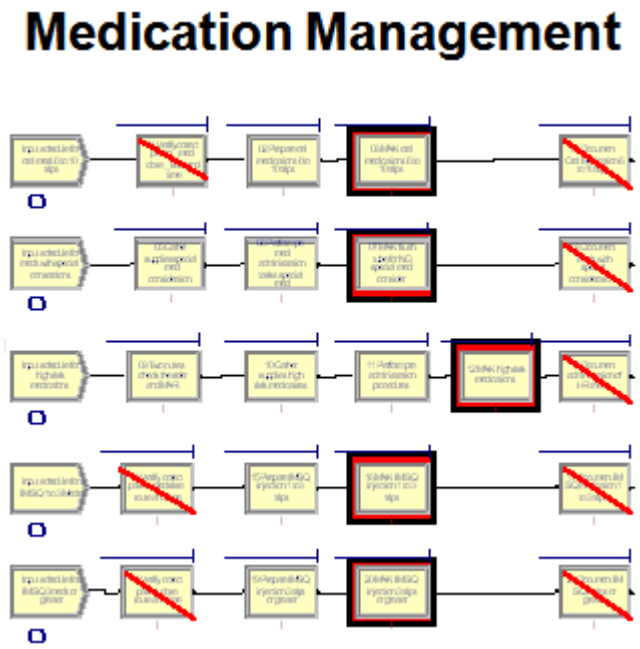
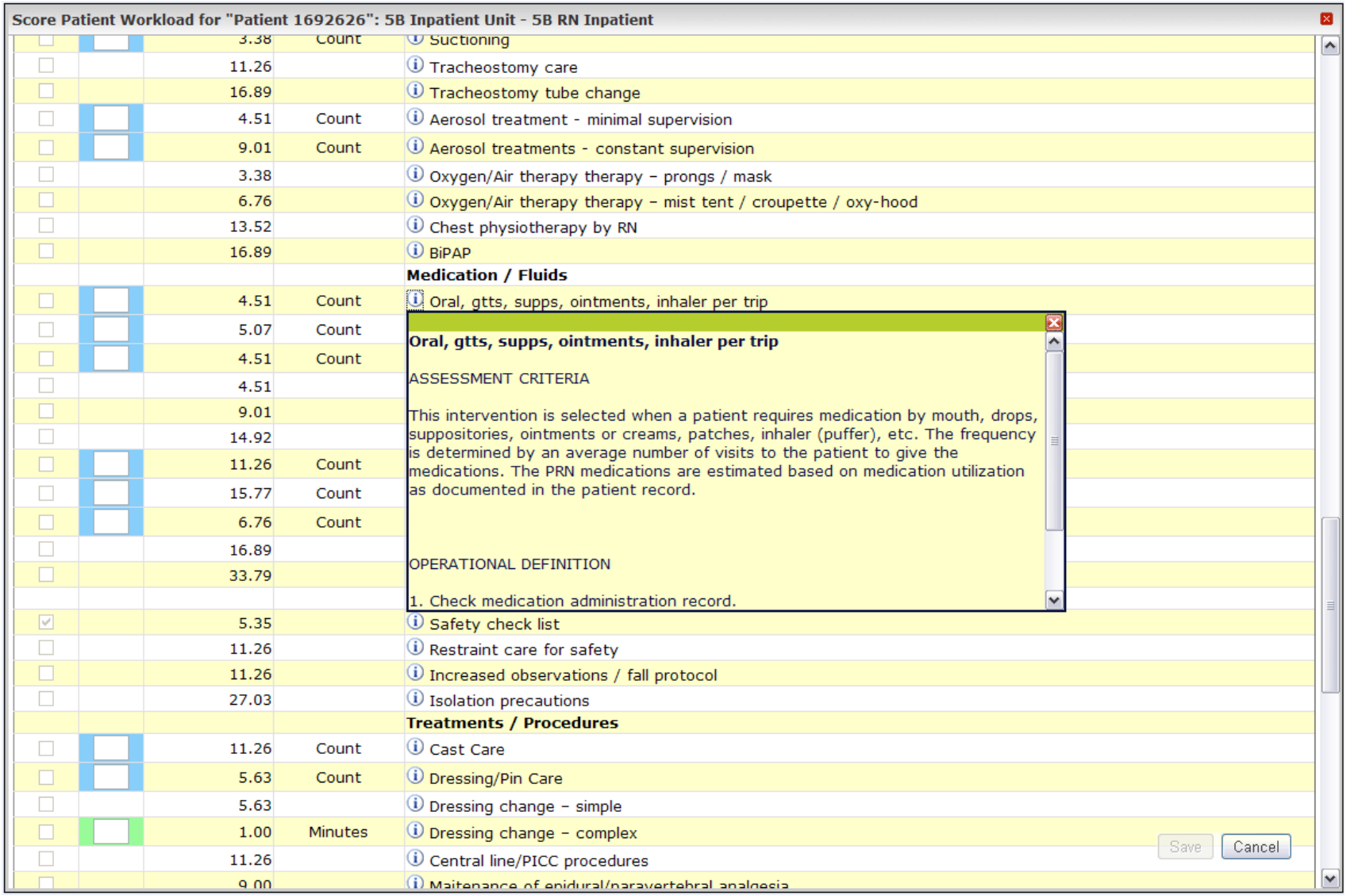
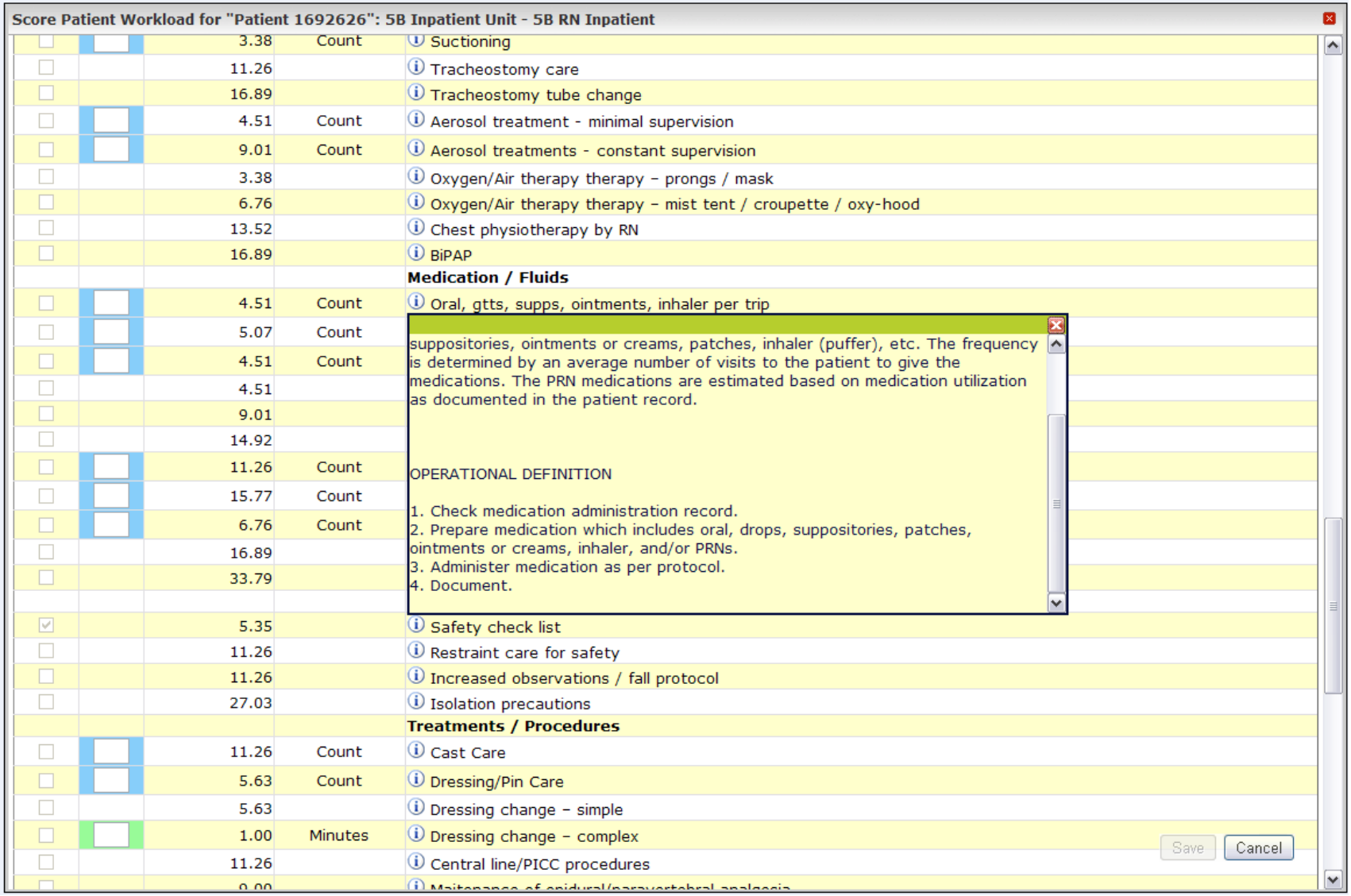
Law, A. & Kelton, W. (2000). Simulation Modeling and Analysis. Boston. McGraw Hill, NY.

Another Enabler is Workload Data

Forecasting Rates of Movement







Challenges in Data Acquisition

What is the distribution of times that it takes to perform the individual tasks in a process?

- Time and motion studies
- Standardized times
- Electronic health record digitization
- Expert opinion
- Theoretical time distribution curves
- Workload time standards

So from the "Lean" with IT Perspective in Performance Improvement Activities we:

- Combine duplicate activities
- Eliminate multiple reviews and approvals
- Automate repetitive tasks
- Simplify complex activities
- Reduce batch sizes
- Reduce amount of handling
- Process in parallel
- Error-proof activities
- Implement demand pull (build to orders)
- Outsource inefficient activities

So the Question is…

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Examine the current state

Where to look for Workload

Medications / Fluids (select as applicable)						
Oral, supp, topical, gtts 1-6 trips/24 hour	11.6	2207		428.6	63.84%	0.2%
Oral, supp, topical, gtts, PRN 6 or more/24 hours	38.8	3671		2,375.4	66.58%	1.3%
High Risk Meds- Hep/Insulin/PCA/Flolan-11.07	3.9	5301	23885	1,546.0	80.37%	0.9%
Meds with Special considerations-11.06	1.3	5209	42169	909.9	83.38%	0.5%
IM/SQ Injections	25.9	4050		1,747.5	66.58%	1.0%
IVPB/IV push meds/IV lock 1-6 trips/24 hours	38.8	1529		989.4	54.98%	0.6%
IVPB/IV push meds/IV Lock 7-15 trips/24 hours	71.2	3548		4,074.2	75.98%	2.3%
IVPB/IV push meds/IV lock > 15 trips/24 hours	116.5	1530		2,681.6	37.44%	1.5%
Meds with Special considerations-11.06	1.3	328	1938	41.8	5.57%	0.0%
IV Fluid Replacement; bolus q 4 hours	23.3	645		247.9	22.10%	0.1%
IV Maintenance1-2 lines - peripheral	30.9	6616		3,432.7	98.08%	1.9%
Peripheral IV lines 3or >/ central lines/PICC /TPN	51.8	5316		4,587.2	81.83%	2.6%
Titratable IV Drips q15-30 minutes	124.2	1631		3,355.3	39.63%	1.9%
Titratable IV Drips q1-2hours use for insulin prot	46.6	3207		2,386.3	54.98%	1.3%
Titratable IV Drips q4-6 hours	15.5	2015		714.8	48.58%	0.4%
PCA/Epidural/Flolan	19.4	2181		795.3	39.63%	0.4%
Blood Products Transfusion 11.06	16.2	1126	2063	848.2	36.99%	0.5%
Blood Transfusion/PRBC's/auto infusion 11.07	28.5	729	1351	774.4	30.32%	0.4%
Massive Fluid /blood Resuscitation -16 hours	1,242.4	82		281.6	2.92%	0.2%
Titratable IV Drips q1-2hours use for insulin prot	46.6	153		118.8	4.02%	0.1%
Titratable IV Drips q4-6 hours	15.5	75		19.4	2.74%	0.0%
PCA/Epidural/Flolan	19.4	123		39.8	2.74%	0.0%
Blood Products Transfusion 11.06	16.2	54	124	33.4	1.64%	0.0%
Blood Transfusion/PRBC's/auto infusion 11.07	28.5	43	73	34.6	1.92%	0.0%

What do we want to do?

- Improvement in medication error intervention
- Decrease in cycle time per intervention to the pharmacist
- Increase in productivity (decrease in time) ie, nursing hours per intervention
- Decrease in total cost per intervention (medication error saving)
- What is the difference between the cost of the investment and the return?

Let's examine the steps

- The intervention

- The steps that are part of the intervention
  - Check medication administration record
  - Prepare medication
  - Administer medication as per protocol
  - Document

- Total time for the process is 33 8 minutes (included if possible and delay and catchup time for things we haven't accounted for)

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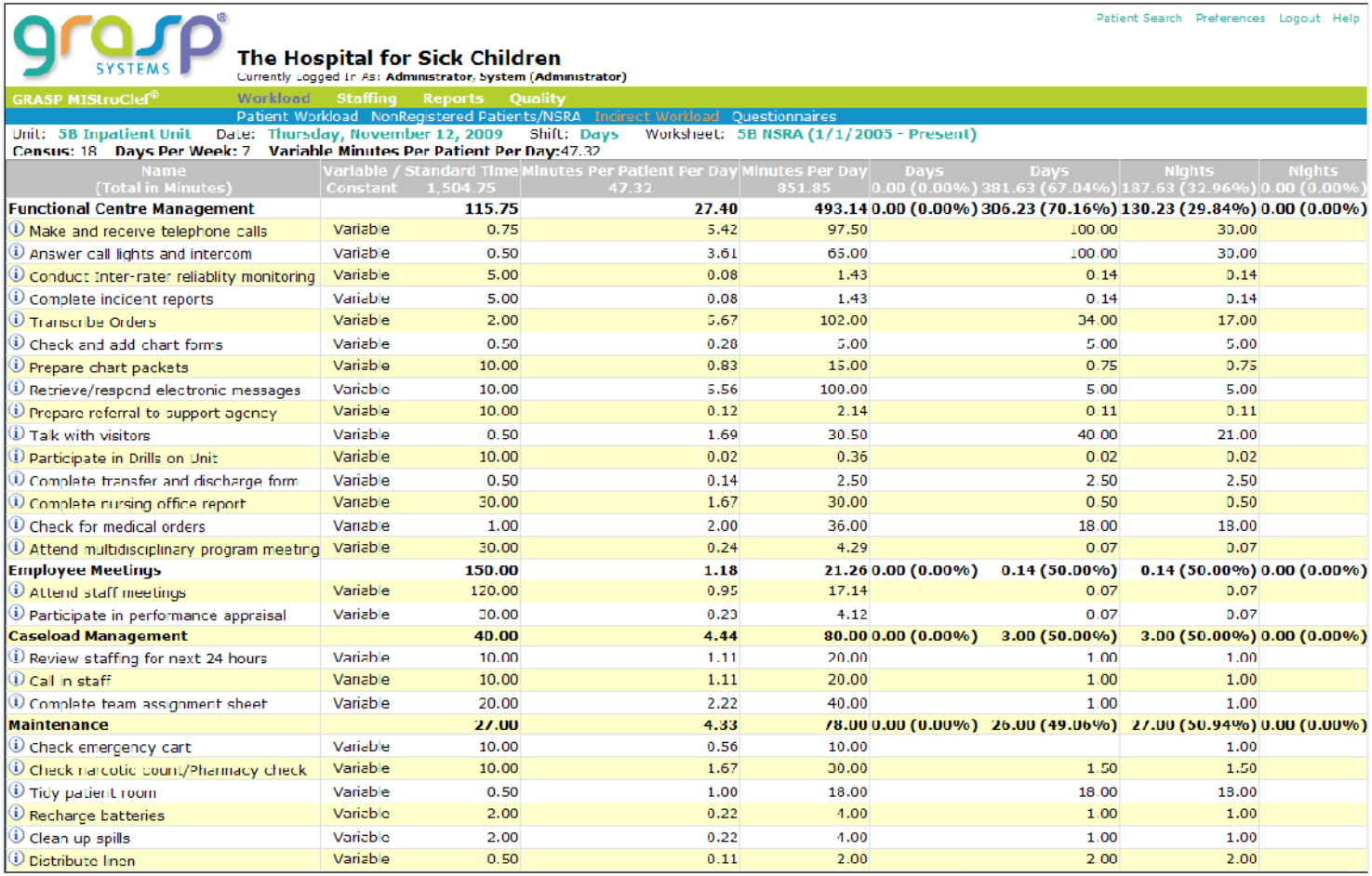
Characteristics

- Barcode symbology does not take longer than the RFID process
- Layout is entirely different
- There is a learning curve
- The emotion of the users evaluated

Interface to Lab!

Non Service Related Care



Patient Search Preferences Logout Help

The Hospital for Sick Children

Currently Logged In As: Administrator, System (Administrator)

GRASP MISTroClef® Workload Staffing Reports Quality

Patient Workload NonRegistered Patients/NSRA Indirect Workload Questionnaires

Unit: 5B Inpatient Unit Date: Thursday, November 12, 2009 Shift: Days Worksheet: 5B NSRA (1/1/2005 - Present)

Census: 18 Days Per Week: 7 Variable Minutes Per Patient Per Day:47.32

Name (Total in Minutes)	Variable / Constant	Standard Time 1,504.75	Minutes Per Patient Per Day 47.32	Minutes Per Day 851.85	Days 0.00 (0.00%)	Days 381.63 (67.04%)	Nights 187.63 (32.96%)	Nights 0.00 (0.00%)
Functional Centre Management		**115.75**	**27.40**	**493.14**	**0.00 (0.00%)**	**306.23 (70.16%)**	**130.23 (29.84%)**	**0.00 (0.00%)**
Make and receive telephone calls	Variable	0.75	5.42	97.50		100.00	30.00	
Answer call lights and intercom	Variable	0.50	3.61	65.00		100.00	30.00	
Conduct inter-rater reliablity monitoring	Variable	5.00	0.08	1.43		0.14	0.14	
Complete incident reports	Variable	5.00	0.08	1.43		0.14	0.14	
Transcribe Orders	Variable	2.00	5.67	102.00		34.00	17.00	
Check and add chart forms	Variable	0.50	0.28	5.00		5.00	5.00	
Prepare chart packets	Variable	10.00	0.83	15.00		0.75	0.75	
Retrieve/respond electronic messages	Variable	10.00	5.56	100.00		5.00	5.00	
Prepare referral to support agency	Variable	10.00	0.12	2.14		0.11	0.11	
Talk with visitors	Variable	0.50	1.69	30.50		40.00	21.00	
Participate in Drills on Unit	Variable	10.00	0.02	0.36		0.02	0.02	
Complete transfer and discharge form	Variable	0.50	0.14	2.50		2.50	2.50	
Complete nursing office report	Variable	30.00	1.67	30.00		0.50	0.50	
Check for medical orders	Variable	1.00	2.00	36.00		18.00	18.00	
Attend multidisciplinary program meeting	Variable	30.00	0.24	4.29		0.07	0.07	
Employee Meetings		**150.00**	**1.18**	**21.26**	**0.00 (0.00%)**	**0.14 (50.00%)**	**0.14 (50.00%)**	**0.00 (0.00%)**
Attend staff meetings	Variable	120.00	0.95	17.14		0.07	0.07	
Participate in performance appraisal	Variable	30.00	0.23	4.12		0.07	0.07	
Caseload Management		**40.00**	**4.44**	**80.00**	**0.00 (0.00%)**	**3.00 (50.00%)**	**3.00 (50.00%)**	**0.00 (0.00%)**
Review staffing for next 24 hours	Variable	10.00	1.11	20.00		1.00	1.00	
Call in staff	Variable	10.00	1.11	20.00		1.00	1.00	
Complete team assignment sheet	Variable	20.00	2.22	40.00		1.00	1.00	
Maintenance		**27.00**	**4.33**	**78.00**	**0.00 (0.00%)**	**26.00 (49.06%)**	**27.00 (50.94%)**	**0.00 (0.00%)**
Check emergency cart	Variable	10.00	0.56	10.00			1.00	
Check narcotic count/Pharmacy check	Variable	10.00	1.67	30.00		1.50	1.50	
Tidy patient room	Variable	0.50	1.00	18.00		18.00	18.00	
Recharge batteries	Variable	2.00	0.22	4.00		1.00	1.00	
Clean up spills	Variable	2.00	0.22	4.00		1.00	1.00	
Distribute linen	Variable	0.50	0.11	2.00		2.00	2.00	

non service recipient care (cont'd)

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Recharge batteries	Variable	2.00	0.22	4.00		1.00	1.00	
Clean up spills	Variable	2.00	0.22	4.00		1.00	1.00	
Distribute linen	Variable	0.50	0.11	2.00		2.00	2.00	
Set up rooms for admission	Variable	2.00	0.56	10.00		2.50	2.50	
Quality Management		**27.00**	**8.36**	**150.43**	**0.00 (0.00%)**	**14.32 (63.64%)**	**25.32 (36.36%)**	**0.00 (0.00%)**
Run errands off unit	Variable	6.00	5.00	90.00		8.00	7.00	
Run errands on unit	Variable	1.00	3.00	54.00		36.00	18.00	
Move patient to/from another unit	Variable	10.00	0.04	0.71		0.04	0.04	
Move patient to/from another room	Variable	10.00	0.32	5.71		0.29	0.29	
Students		**5.00**	**1.06**	**19.12**	**0.00 (0.00%)**	**1.91 (50.00%)**	**1.91 (50.00%)**	**0.00 (0.00%)**

A Word About the Power of Groups or
The Wisdom of Crowds
(Workload groups are also enablers!)

- People who do the work are the best people to find the needed improvements

- Smart groups
  - Diverse
  - Independent
  - Decentralized
  - Need a structured format
  - Have basic ground rules

Using Simulation

- Benefits
  - Decrease up front investment
  - Test new protocols and procedures before implementation
  - Awareness of benefits and drawbacks before implementation (↓ surprises)
  - Better awareness of cost benefits/savings
- Drawbacks
  - In house expertise - if you have it
  - If you don't have in house expertise – long learning curve
- Partnerships

Way Forward

Can "Lean" Staffing Workload data assist in achieving the goal briefly stated?

Goal

Give to patients;
exactly what they need;
when they need it;
every time;
defect free;
in a safe environment;
at the lowest cost;
without waste

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[illegible] "*Simulation Based Lean Six Sigma" (Presentation).* [illegible]® [illegible]

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