

Staffing Profile Tool

3	Flow Calculation	Split Flow
4	LOU/LOH/LOT	Inpatient Transitional Care
5	Capacity Planning	Time Stamps
6	Staffing Profile	Target Utilization
		Integer Effect

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Analysis Goals

- With this tool the user will be able to answer the question: “What are the provider staff requirements in each area of my new Split ED by hour of day?”
 - Providers may be doctors, nurses, techs, doctor/nurse teams, etc. depending upon the characteristics of the location being staffed.
- This decision is based on arrivals per hour to each area, ‘productivity’ in each area, and a generic time of day arrival pattern.

Provider 'Productivity' Definition

- Provider Productivity (productivity, for short) is defined as the number of patients per hour that one provider at a given area can serve.
- 'One provider' may be a team of people.
- The skill mix used in an area is assumed to be included in the value of the productivity (e.g. 2.5 patients per hour may be low for one skill mix, yet high for another).
- Examples of the basic idea:
 - Quick Look nurses perform a 5-10 minute assessment and can therefore serve ~8 patients per hour.
 - IP_{ED} doctor teams are often contractually measured, with values of 2 patients per hour not unusual.

Tool 6 Data Inputs

- Average Arrivals/Hr by area from Tool **3**
- LOU in IP_{ED} from Tool **4**
- Provider productivity (patients/hour/provider). A work area is available productivity calculations based on service time (min/patient/doc).

INPUT		
Doc Productivity by Area	Staff Service Time per Patient (min.)	Physician Productivity per Hour
Quick Look	7.5	8.0
Intake/Discharge	11.3	5.3
Results Waiting	15.0	4.0
IP _{ED}		2.0
Inpatient Transitional Care		3.0

- Arrival Hour-of-Day Peaking Pattern (if different than default desired)
 - Multiplicative Indices must sum to 24.
 - The defaults based on generic pattern introduced in Tool 2 is shown in the Table to the right.

INPUT	
Time of Day Pattern	Multiplicative Indices
0:00	0.75
1:00	0.59
2:00	0.48
3:00	0.42
4:00	0.39
5:00	0.38
6:00	0.48
7:00	0.65
8:00	0.88
9:00	1.04
10:00	1.27
11:00	1.31
12:00	1.35
13:00	1.29
14:00	1.19
15:00	1.25
16:00	1.35
17:00	1.32
18:00	1.37
19:00	1.45
20:00	1.43
21:00	1.30
22:00	1.12
23:00	0.93

Calculations in Tool 6 [1][2]

- Providers required in all areas except Inpatient Transitional Care are:

$$\text{Providers Needed During Hour}_i = \frac{(\text{Area's Average Arrival Rate} * \text{Multiplicative Index}_i)}{\text{Provider Productivity per Hour}}$$

- Provider needs for the Inpatient Transitional Care area are lagged by 3 hours (a typical IP_{ED} LOU) to reflect delay from ED arrival to admit status.

$$\text{IPTC Providers Needed During Hour}_i = \frac{(\text{Area's Average Arrival Rate} * \text{Multiplicative Index}_{i-3})}{\text{Provider Productivity per Hour}}$$

3 Hour time lagged arrival rate to IPTC

- To assure patient safety, the raw number from this formula is rounded up to the next integer. The effect of this rounding, the 'integer effect' can be significant and should be considered in decision making.
- A plot, by hour of the day, for each area is generated showing the estimated arrival rate to each area and the productivity rate that the selected number of providers will have, for comparison.

The EXCEL[®] Tool 6

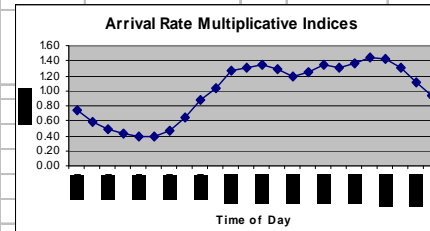
Purpose: To determine the necessary staffing profile in each split flow area.

INPUT					
	Quick Look	Intake/Discharge	Results Waiting	IP _{ED}	Inpatient Transitional Care
Average Arrivals/Hr.	9.71	17.75	8.67	2.58	2.14

- 3 Flow Calculation
- 4 LOU/LOH/LOT
- 5 Capacity Planning
- 6 Staffing Profile

Split Flow	
Inpatient Transitional Care	
Time Stamps	
Target Utilization	
Integer Effect	

INPUT		
Doc Productivity by Area	Staff Service Time per Patient (min.)	Productivity per Hour
Quick Look	7.5	8.0
Intake/Discharge	17.8	2.5
Results Waiting	15.0	4.0
IP _{ED}		2.0
Inpatient Transitional Care		3.0

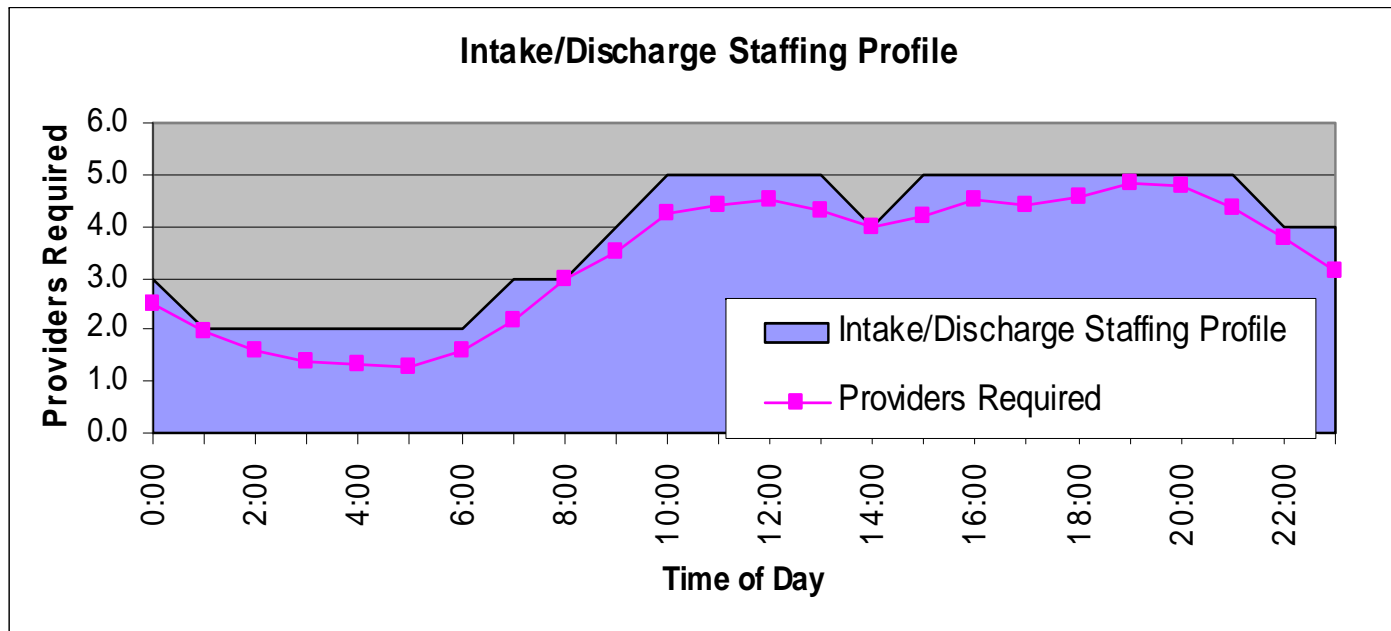


INPUT		OUTPUT - Patient Arrivals/Hr by Area					OUTPUT - Provider Staffing Profile by Area				
Time of Day Pattern	Multiplicative Indice	Quick Look	Intake/Discharge	Results Waiting	IP _{ED}	Inpatient Transitional Care	Quick Look	Intake/Discharge	Results Waiting	IP _{ED}	Inpatient Transitional Care
0:00	0.75	7.3	13.3	6.5	1.9	2.8	1.0	6.0	2.0	1.0	1.0
1:00	0.59	5.8	10.5	5.1	1.5	2.4	1.0	5.0	2.0	1.0	1.0
2:00	0.48	4.7	8.5	4.2	1.2	2.0	1.0	4.0	2.0	1.0	1.0
3:00	0.42	4.1	7.5	3.6	1.1	1.6	1.0	3.0	1.0	1.0	1.0
4:00	0.39	3.8	7.0	3.4	1.0	1.3	1.0	3.0	1.0	1.0	1.0
5:00	0.38	3.7	6.8	3.3	1.0	1.0	1.0	3.0	1.0	1.0	1.0
6:00	0.48	4.6	8.5	4.1	1.2	0.9	1.0	4.0	2.0	1.0	1.0
7:00	0.65	6.3	11.5	5.6	1.7	0.8	1.0	5.0	2.0	1.0	1.0
8:00	0.88	8.6	15.7	7.6	2.3	0.8	2.0	7.0	2.0	2.0	1.0
9:00	1.04	10.1	18.5	9.0	2.7	1.0	2.0	8.0	3.0	2.0	1.0
10:00	1.27	12.3	22.5	11.0	3.3	1.4	2.0	9.0	3.0	2.0	1.0
11:00	1.31	12.8	23.3	11.4	3.4	1.9	2.0	10.0	3.0	2.0	1.0
12:00	1.35	13.1	24.0	11.7	3.5	2.2	2.0	10.0	3.0	2.0	1.0
13:00	1.29	12.6	23.0	11.2	3.3	2.7	2.0	10.0	3.0	2.0	1.0
14:00	1.19	11.6	21.2	10.4	3.1	2.8	2.0	9.0	3.0	2.0	1.0
15:00	1.25	12.2	22.2	10.9	3.2	2.9	2.0	9.0	3.0	2.0	1.0
16:00	1.35	13.1	24.0	11.7	3.5	2.8	2.0	10.0	3.0	2.0	1.0
17:00	1.32	12.8	23.3	11.4	3.4	2.6	2.0	10.0	3.0	2.0	1.0
18:00	1.37	13.3	24.3	11.9	3.5	2.7	2.0	10.0	3.0	2.0	1.0
19:00	1.45	14.1	25.7	12.6	3.7	2.9	2.0	11.0	4.0	2.0	1.0
20:00	1.43	13.8	25.3	12.4	3.7	2.8	2.0	11.0	4.0	2.0	1.0
21:00	1.30	12.6	23.1	11.3	3.4	2.9	2.0	10.0	3.0	2.0	1.0
22:00	1.12	10.9	19.9	9.7	2.9	3.1	2.0	8.0	3.0	2.0	2.0
23:00	0.93	9.1	16.5	8.1	2.4	3.1	2.0	7.0	3.0	2.0	2.0
Sum	24.00										

Must equal 24

Using Tool 6 Outputs

- A plotted staffing profile for one of the areas is shown below. Note the 'integer effect' of needed vs. staffed.



- The pattern of provider shifts (e.g. 8 hour or 12 hour) used in your ED can be superimposed on this profile to match provider shifts to patient needs.

Staffing Needs by Area

	OUTPUT – Provider Staffing Profile by Area				
	Quick Look	Intake / Discharge	Results Waiting	IP _{ED}	Inpatient Transitional Care
Tool 6 Output Definition	The actual number of providers required	The number of provider teams required	The actual number of providers required	The number of provider teams required	The actual number of providers required
Staff / Skill Mix	RNs	A provider team consists of: 1 physician 1 RN and 0.5 ED Tech	A minimum of one RN is required in results waiting for visual assessment of patients in this area. Additional needs for staff can be augmented with ED techs, LPNs, and RNs. The number and skill mix of staff may need to be adjusted based on the patient mix.	A provider team consists of: 1 physician 2 RNs and 1 ED Tech The mix of RNs and ED Techs may vary with increasing volumes in addition to a more acute patient mix than in the past. Now the less acute patients will go through Intake and will not be care for in the IP ED.	This area is to be staffed by acute inpatient nursing staff. The RN ration of staff to patients will depend on the numbers of med/surg, tele and ICU patients. Generally, a 4:1 patient to RN ratio is needed.

Other Special Staffing Needs

	Other Provider Staffing Needs by Area				
	Quick Look	Intake / Discharge	Results Waiting	IP _{ED}	Inpatient Transitional Care
Procedures / Specimen Acquisition			1 RN and 1 ED Tech is required to support approximately 10 procedures and/or specimen acquisitions per hour. Generally, 30-40,000 visits per year are needed to have this staff separately. Otherwise, this area is supported by the Results Waiting staff, which would need to be adjusted.		
Registration	One Registration Clerk is required to support Quick Registration. The Quick Look RN could also collect the Quick Registration information. This would require an adjustment to the number of Quick Look RNs.				
Clerical		Other clerical staff such as a Unit Secretary role may need to support this area based on level of technology.		Other clerical staff such as a Unit Secretary role may need to support this area based on level of technology.	

Next Steps:

 Managing Implementation

- Outlines the best management strategies for implementing D2D.
- Applies the completed analytical and acceptance tools to the current environment using project management concepts and techniques.

References

- [1] discusses set covering used in staffing
- [2] describes the use of set covering to staff hospital services.

[1] Rardin RL. *Optimization in Operations Research*. New Jersey: Prentice Hall, Inc.; pp. 566-572. 1998.

[2] Ozcan YA. *Quantitative Methods in Healthcare Management*. California: Jossey-Bass; pp. 152-176. 2005.