

# **Practical Solutions for Capacity (Surge) Management in Hospitals**

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**The Second National Emergency Management  
Summit**

**Washington DC  
February 3rd 2008**

**Barbara Bisset, PhD MPH MS RN EMT  
Executive Director  
Emergency Services Institute  
WakeMed Health & Hospitals**

# Presentation Objectives

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- To provide an awareness of tools for successful daily hospital capacity management
  - Capacity Management Criteria Matrix: Levels 1-5
  - Daily Management Report
  - Department Capacity Management Quick Response Guides
  - Hospital Expansion Space Matrix
  - Emergency Operations Assigned Spaces

# Project Deliverables

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- Concept for use in hospital's daily operations
- Flexible template for use by North Carolina rural or urban hospitals
- Template adaptable to existing hospital processes

# Capacity Management Challenges

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# Considerations for Planning: Acute Events

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- Anticipate patients arriving within 15 minutes
- Most casualties will NOT arrive by ambulance
- Least serious casualties generally arrive first
- Casualties disproportionately distributed between hospitals

# Considerations for Planning

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- Most hospitals already operate at maximum or high level capacity
- Multiple portals of entry for admission
- Capacity issues may last for days, weeks or months
- Most hospitals operate with staffing shortages on a regular basis

# Definitions

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- Capacity Surge (Volumes of Patients)
  - Ability to evaluate and care for markedly-increased volume of patients exceeding normal capacity
  - Surge requirements may extend beyond direct patient care
    - E.g., laboratory studies, epidemiological investigations

# Definitions

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- Capability Surge (Types of Patients)
  - Ability to manage patients requiring unusual or very specialized medical evaluation and care
  - Expertise, information, procedures, equipment and personnel are normally not at the location where they are needed
  - Special intervention to protect medical providers, patients, and/or facility



# Definitions

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- Capability (Types of Patients)
  - Special populations
    - Diagnosis indicates need for cohorting, isolation,
    - Acuity level requires critical care
    - Compassionate / palliative care
    - Burns
    - Pediatrics
    - Dialysis
    - Contaminated patients
    - Mental / social health
    - Concerned, but well
  - Care requires specialized equipment, supplies, space, facility requirements, and/or knowledgeable, skilled staff

# Scope of Capacity Plan

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- Management of patient capacity, capability surge emergency, or disaster event within hospitals
- Does NOT include alternative care facilities or other state and/or community initiatives

# Capacity Management Criteria Matrix

## Levels 1-5

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### Homeland Security Advisory System

Homeland Security Advisory System (GRAY)	<b>LOW</b> (Low Risk of Terrorist Attacks) (Green)	<b>GUARDED</b> (General Risk of Terrorist Attacks) (Blue)	<b>ELEVATED</b> (Significant Risk of Terrorist Attacks) (Yellow)	<b>HIGH</b> (High Risk of Terrorist Attacks) (Orange)	<b>SEVERE</b> (Severe Risk of Terrorist Attacks) (Red)	(Lavender)
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### Hospital Capacity Management System

Capacity Alert Levels (Gray)	<b>LEVEL 0</b> (OPEN) (Green)	<b>LEVEL 1</b> (PRE-CAPACITY) (Blue)	<b>LEVEL 2</b> (IMPAIRED) (Yellow)	<b>LEVEL 3</b> (GRIDLOCK) (Orange)	<b>LEVEL 4</b> (DIVERSION/ON HOLD) (Red)	<b>LEVEL 5</b> Local, Regional or State Declared Emergency /Disaster (Lavender)
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Resource for Capacity Levels 0-4:

Lehigh Valley Hospital & Health Network, Allentown Pennsylvania

# Capacity Management Criteria Matrix Levels 1-5

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- Steps to Develop Criteria for Levels
  1. Identify all portals of entry to hospital system
  2. Identify criteria that are common predictors for successful “throughput”, such as:
    - Vacancies
    - Discharges vs. Admission Requests
    - Internal Transfers
    - Flow at Portals of Entry
  3. Identify the criteria formula for each level (0-5) for
    - Portals of Entry Departments
    - Each inpatient facility within the hospital system
    - Hospital System-wide

# Capacity Management Criteria Matrix

## Levels 1-5

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Alert Level	Open	Pre-Capacity	Impaired	Gridlock	Diversion	Declared Emergency
Vacancies						
DC's vs. Admits						
Internal Transfers						
Flow at Portals of Entry						

# Capacity Management Criteria Matrix Levels 1-5

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Capacity Management Criteria Matrix Levels 0-5 Description  
For Hospital System

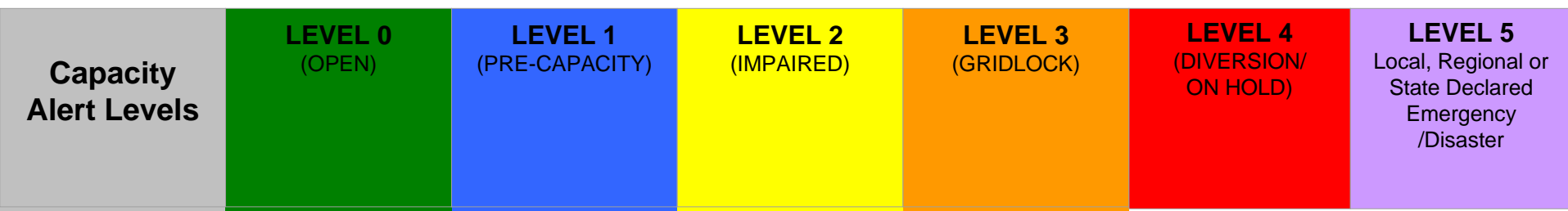
Hospital Capacity Criteria Matrix Levels 0-5 Description						
Alert Levels	LEVEL 0 (OPEN)	LEVEL 1 (PRE-CAPACITY)	LEVEL 2 (IMPAIRED)	LEVEL 3 (GRIDLOCK)	LEVEL 4 (DIVERSION/ON HOLD)	LEVEL 5 (EMERGENCY/DISASTER) Local, Declared Regional, State, National
Alert Level Definition: <u>Vacancies</u>	1) Bed vacancies available at all levels of care (floor, intermediate: medical monitored & cardiac monitored, step-down, ICU)	1) No bed vacancies in one level of care.	1) No bed vacancies in more than one level of care.	1) Limited to no bed vacancies at all levels of care.	1) No bed vacancies at all levels of care.	The hospital receives notice from an emergency first responder agency or official organization that there is an emergency event or declared disaster and it is anticipated there will be an impact on hospital operations. <u>Capacity:</u> There is an
Alert Level Definition: <u>Discharges vs. Admits</u>	2) Projected discharge volume will accommodate scheduled or emergent admissions.	2) Projected discharge volume will accommodate scheduled or emergent admissions.	2) Projected discharges equal scheduled or emergent admissions.	2) Projected discharge volume will not accommodate scheduled or emergent admissions.	2) Projected discharge volume will not accommodate scheduled or emergent admissions.	expected influx of patient volumes. There may either be a rapid influx or a gradual increase in volume, depending on the type of event. Anticipate the immediate

# Department Capacity Management Quick Response Guides

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All departments focus on capacity processes:

- Every department develops action plan for response to each of the five levels
- Level five includes department steps for responding to mass casualty events



# Department Capacity Management Quick Response Guides

Sample of Department Capacity Management Quick Response Guide

Alert Levels	LEVEL 0 (OPEII)	LEVEL 1 (PRE-CAPACITY)	LEVEL 2 (IMPAIRED)	LEVEL 3 (GRIDLOCK)	LEVEL 4 (DIVERSION/ON HOLD)	LEVEL 5 (DECLARED EMERGENCY) Local, Regional, State, National
Case Management	Assess patients for discharge plans; coordinate post-discharge care	<p><i>Same as Level 0 with the addition of the following actions:</i></p> <p>Communicate with Case Management staff by email level status. Coordinate with families to discharge patients earlier in the day. Pay for cabs, equipment, aides, etc. Supervisors perform round on units to identify barriers to patient discharge, patient transfer to lower level of care and to assist staff.</p>	<p><i>Same as Level 1 with the addition of the following actions:</i></p> <p>Case Management staff to review census with charge nurse to identify possible discharges, patients that can be transferred to alternate level of care, and patients for discharge lounge. Request that ambulance services expedite transfers to Skill Nursing Facilities, which may include contracting with outside agencies.</p>	<p><i>Same as Level 2 with the addition of the following actions:</i></p> <p>Communicate with CM staff by text page level of status. Contact community MD's for patients anticipated to be discharged the next day for discharge order and discharge paperwork for today. Alert Hospitalists to identify possible discharges or assist with discharges earlier in the day. Staff to approve cabs, equipment, etc up to \$150.00. Heighten communication with post-acute services regarding: patient status and anticipated needs.</p>	<p><i>Same as Level 3</i></p> <p>Plan to participate on the Capacity/ Capability task forces and strike teams. Refer to Section 5 of the Capacity/ Capability Emergency Operations Plan.</p>	<p>Perform an immediate assessment of potential discharges. Determine time frame needed and mode of transportation needed.</p> <p>Refer to <i>Patient Prioritization Assessment Form</i>.</p>



# Considerations for Determining Expansion Spaces Within Facility

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- Regulatory standards are applicable at all levels of capacity
  - Licensed versus unlicensed space
  - Division of Health Services Regulations FS must be notified before use of unlicensed space
- Consider ways for immediate bed expansion (within 30 minutes)
- Need to consider space requirements for capability population, e.g. pediatrics, burns

# Considerations for Determining Expansion Spaces Within Facility

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## Identification of Patient Care Expansion Spaces

- Capacity Matrix
- Capability Matrix
- Identify actual space, number of potential beds, equipment, supplies and staffing needed
- Estimated time needed for set up

# Inpatient *Capacity* Expansion Matrix

Inpatient Capacity Expansion Space Matrix

^ = Yes	Level 2 Impaired						Level 3 Gridlock						Level 4 Diversion/ Holding						Level 5 Emergency/Disaster					
<b>Name of Expansion Space</b>																								
<b>Patient Type</b>	Critical Care	Intermediate (Telemetry)	L&D	Med/Surg	Observation	Pediatrics	Critical Care	Intermediate (Telemetry)	L&D	Med/Surg	Observation	Pediatrics	Critical Care	Intermediate (Telemetry)	L&D	Med/ Surg	Observation	Pediatrics	Critical Care	Intermediate (Telemetry)	L&D	Med/ Surg	Observation	Pediatrics
<b>Number of Beds</b>																								
Hrs. Needed to Open Beds (1,12,24, or 48)																								
Staffing Needs: RN's																								
Staffing Needs: Technicians																								
Staffing Needs: Unit Secretary's																								
Staffing Needs: Other Support																								
Emergency Power																								
Isolation Capable																								
Cardiac Monitor																								
Limited or Small Space																								

# Inpatient *Capability* Expansion Matrix

Inpatient Capability Expansion Space Matrix

Hrs. Needed to Open Beds (1,12,24, or 48, 72)	Number of Beds	Type of Capability (Specialty Beds)	Name of Expansion Space	Observation	Acute Care- Non-Monitored	Intermediate Care	Critical Care
				Monitored			
		Biological: Isolation					
		Biological: Negative Pressure					
		Blast and/or Burn Injuries					
		Chemical Injuries (may cohort)					
		OB – Labor and Delivery					
		Pediatrics Illness/Injury					
		Radiological Illness					
		Biological: Isolation					
		Biological: Negative Pressure					
		Blast and/or Burn Injuries					
		Chemical Injuries (may cohort)					
		OB – Labor and Delivery					
		Pediatrics Illness/Injury					
		Radiological Illness					
		Biological: Isolation					
		Biological: Negative Pressure					
		Blast and/or Burn Injuries					
		Chemical Injuries (may cohort)					
		OB – Labor and Delivery					
		Pediatrics Illness/Injury					
		Radiological Illness					
		Biological: Isolation					
		Biological: Negative Pressure					
		Blast and/or Burn Injuries					
		Chemical Injuries (may cohort)					
		OB – Labor and Delivery					
		Pediatrics Illness/Injury					
		Radiological Illness					

# Emergency Department Expansion Matrix

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Emergency Department Capacity Expansion Space Matrix

^ = Yes	Level 2 Impaired				Level 3 Gridlock				Level 4 Diversion/ Holding				Level 5 Emergency/Disaster			
Name of Expansion Space																
Patient Type	Triage	Acute Treatment	Non-Acute Treatment	Observation	Triage	Acute Treatment	Non-Acute Treatment	Observation	Triage	Acute Treatment	Non-Acute Treatment	Observation	Triage	Acute Treatment	Non-Acute Treatment	Observation
<b>Number of Beds</b>																
Hrs. Needed to Open Beds (1,12,24, or 48)																
Staffing Needs: RN's																
Staffing Needs: Technicians																
Staffing Needs: Unit Secretary's																
Staffing Needs: Other Support																
Emergency Power																
Isolation Capable																
Cardiac Monitor																
Limited or Small Space																
Medications																

# Capacity Expansion Space Equipment and Supplies Assessment

Capacity Expansion Space Equipment and Supplies Assessment		
Type of Expansion Space		
<input type="checkbox"/> Medical Surgical <input type="checkbox"/> ICU <input type="checkbox"/> Intermediate Care <input type="checkbox"/> Pediatrics <input type="checkbox"/> OB		
Special Needs		Patient Type
Cardiac monitors		Critical care, Intermediate care
Cardiac monitor central station (as needed)		Critical care, Intermediate
Isolettes		Neonates
Cribs		Pediatrics
Oxygen source (portable or in-line)		All
Suction (portable or in-line)		All
Call bells		All
Privacy curtain/screen		All
Medications including dispensing area. Narcotic lock (if applicable)		All
Armband and label printer (if applicable)		All
Lab label printer or barcode reader equipment (if applicable)		All
Fire extinguisher/s		All
Fire exit plan (posted)		All
<b>Medical Equipment/Supplies</b>		<b>Medical Equipment/Supplies</b>
Suction regulators		Portable cardiac monitors
Oxygen regulators		Ventilators
Crash cart with contents (adult and pediatric)		Linen hampers
Defibrillator		
Hospital beds		
Bedside commodes		
Wheelchairs		
Recliners (optional)		
Patient/visitor chair		
Glucometer		
Pulse oximeter (portable)		<b>Communication Equipment</b>
Over-bed tables		Computers
Blood pressure cuffs		Fax machine
Linen cart/s with linen		Copier or access to copier
Thermometers		Telephones (consider also patient-use phone/s) – landline, cellular, and wireless (as appropriate)
Medication refrigerator		
Gowns (include neonatal, pediatric and adult)		
Blankets (if applicable)		

# Capacity Expansion Space Equipment and Supplies Assessment

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## Equipment and Supplies

- Just-in-time inventories vs. preparedness for 72+ hours
- Specialty equipment for capability events
- Mobility of equipment

# Emergency Operations Support Space

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- Hospital Command Center
- Crowd Management Center
- Call Centers
  - Medical Advice
  - Hospital Public Emergency Information
- Staging Centers for Transfer of Patients
- Discharge Patient Lounges





# Daily Capacity Management Report

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Send daily report to management

More frequently reported at Level 3-4

Recalculated when emergency event is declared

Incorporate colors, criteria, action plan

- Management page messages at 6 am
- Surgery Report
- Email messages to management
- Capacity Spreadsheet
- Physician Alert Screens

Capacity Alert Levels	<b>LEVEL 0</b> (OPEN)	<b>LEVEL 1</b> (PRE-CAPACITY)	<b>LEVEL 2</b> (IMPAIRED)	<b>LEVEL 3</b> (GRIDLOCK)	<b>LEVEL 4</b> (DIVERSION/ ON HOLD)	<b>LEVEL 5</b> Local, Regional or State Declared Emergency
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# Daily Capacity Management Report

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Sample of Daily Capacity Management Reports			
Patient Access-Surgery Status Report			
Wednesday, July 18, 2007 at 0630			
Occupancy-92%			
(NOTE: Occupancy data includes patients holding in PACU, cath lab, ED awaiting beds)			
Level 1: Blue: "Pre-Capacity"			
Clinical Unit	Beds Needed	Beds Available	
		Scheduled OR Cases:	Vacancies @ 0630
	1) Inpatients needing a "new" bed 2) Outpatients needing a bed post-op	Operating beds only	1) Discharges and/or 2) Transfers
Observation (OBS-2)	3	1	5
CV Surgery (3B)	0	no beds	6
CV Surgery (CTSU)	4	no beds	2
Urology (3C)	3	no beds	3
Gynecology (4A)	3	6	6
C-Sections (4B-PP)	1	3	9
Pediatrics (4C)	1	1	7
Pediatrics (PICU)	1	5	0
Neuro-Surgery (5B)	2	5	2
Neuro-Surgery (NICU)	0	no beds	1
Orthopedics (6B)	2	4	4
General Surgery (6C)	3	no beds	4
Surgery (SICU)	1	1	1

# Daily Capacity Management Report

## Capacity Management Report: Raleigh Campus

DATE: 07/18/2007

TIME: 08:00

CURRENT DATA (Data Source: PreAdmit Tracking)												
	Licensed Beds	Operating Beds	Occupied Beds	Occupancy Rate (per operating beds)	Flexed	Closed	Usable Vacancies (excludes ICN,5BN)	Pending D/C w/i 24hrs	Pending D/C >24hrs	Pending transfers		
<b>GRAND TOTAL</b>	515	553	542	98%	5	5	48	112	0	11		
<b>Critical Care</b>	56	56	50	89%	0	0	6	0	0	6		
CCUA	12	12	10		0	0	2	0	0	1		
CCUA	6	6	5		0	0	1	0	0	0		
CTSU	12	12	12		0	0	0	0	0	2		
MICU	9	9	7		0	0	2	0	0	1		
NICU	8	8	8		0	0	0	0	0	1		
SICU	9	9	8		0	0	1	0	0	1		
<b>CV</b>	128	128	127	99%	0	1	0	28	0	1		
3A	41	41	41		0	0	0	11	0	0		
3B	41	41	40		0	1	0	6	0	0		
6A	38	38	38		0	0	0	10	0	1		
CCUB	8	8	8		0	0	0	1	0	0		
<b>Med-Surg</b>	128	128	121	95%	0	2	5	15	0	0		
3C	24	24	23		0	0	1	3	0	0		
5A	45	45	40		0	1	4	5	0	0		
5C	29	29	28		0	1	0	3	0	0		
6C	30	30	30		0	0	0	4	0	0		
<b>Observation</b>	0	37	26	70%	0	0	11	13	0	4		
CPU	0	14	13		0	0	1	8	0	1		
OBS 2	0	12	11		0	0	1	5	0	1		
OBS 3	0	11	2		0	0	9	0	0	2		
<b>Ortho-Neuro</b>	72	72	61	85%	0	2	9	6	0	0		
5B	39	39	32		0	2	5	2	0	0		
6B	33	33	29		0	0	4	4	0	0		
<b>WACS</b>	125	126	102	81%	5	0	17	22	0	0		
4A	24	24	19		0	0	5	6	0	0		
1,2, 25-34	11	12	8		0	0	4	0	0	0		
3-12, 14-24	21	21	18		0	0	3	9	0	0		
4C	25	25	20		5	0	0	7	0	0		
PICU	8	8	3		0	0	5	0	0	0		
ICN	18	18	19									
MNUR	18	18	15									
NNU	0	36	36	100%								
<b>Rehab</b>	78	78	70	90%	0	0	8					
2D	44	44	42		0	0	2					
2C	28	28	22		0	0	6					
5B (acute)	6	6	6		0	0	0					
6B	6	6	6		0	0	0					
<b>Holding Beds</b>	0	0	49									
AED/CED	0	0	4									
HCOA	0	0	29					12	0	0		
Holding	0	0	3									
OSHA/PACU	0	0	9									
RAHA	0	0	4									
<b>Fuquay</b>	36	36	30	83%			6					
<b>Zebulon</b>	19	19	14	74%			5					

LEVEL 0 (OPEN)	LEVEL 1 (PRE-CAPACITY)	LEVEL 2 (IMPAIRED)	LEVEL 3 (GRIDLOCK)	LEVEL 4 (Diversion/ On Hold)	LEVEL 5 (Declared Emergency)
	7/18/07 @ 8:00				

### BEDS NEEDED (Data Source: PreAdmit Tracking)

\*\* PACU numbers = scheduled OUT-PATIENTS that will need a bed after surgery.  
 \*\* Radiology, Cath lab = scheduled OUT-PATIENTS that may need a bed post-procedure.

All other numbers are patients waiting/scheduled for a bed.

	FLOOR	Step down	UNIT	CPU	TELE	Med Monitor	TOTAL
AED (patients with orders)		1	1		2		4
CED (patients with orders)							0
WMN (patients with orders)							0
CPU (in-patients with orders)	1						1
OBS2 (in-patients with orders)	1						1
OBS3 (in-patients with orders)		1					2
PACU**	16		4				20
Radiology**	10						10
Cath Lab**					38		38
Other Hospitals			1				1
MD Office/Clinics							0
Home	4						4
Other							0
<b>TOTAL</b>	32	2	6	0	40	1	81

### ED VOLUME (Data Source: HEMED)

Main Waiting Room	
Stretcher Triage (10)	
Trauma Room (3)	
A-Bay (8)	4
RADHA	
B-Bay (9)	5
C-Bay (13)	7
D-Bay (Waiting Room)	
D-Bay (17)	4
CED Waiting Room	
CED (22)	1
<b>TOTAL</b>	21

### Operative/Procedural Stats (Data Source: PHS)

	07/18	07/19
Cardiac	4	5
Vascular Surgery	5	2
Angiography		
Invasive Cardiology	51	31
Endo	4	13
ENT	6	9
General Surgery	8	11
Neuro	3	1
OB/Gyn	7	7
Ortho	10	6
Oral Surg/Pediatric/Plastic/Oph	3	1
Anesthesia/Infusion	5	3
Pediatric Surgery/Urology	5	8
Urology	3	2
<b>TOTAL</b>	114	99

### ED Wait Times (Data Source: HEMED)

Time of ED Report: 07/18/2007 08:19			
Adult Avg Wait Time	0:00	Adult Range of Wait Times	0:00-0:00
CED Avg Wait Time	1:14	CED Range of Wait Times	1:14-1:14

Wait time=Adult-waiting in the Main waiting room or Stretcher triage; CED-child waiting in CED waiting room.

# Daily Capacity Management Report

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## Sample of Daily Capacity Management Reports

**From:** HEIDI MCAFEE  
**To:** Capacity Report-CH; Capacity Report-Charge Nurses, etc; Capacity Report-ED Clinicians; Capacity Report-Misc; Capacity Report-PACU; Capacity Report-Rehab Leads; Case Management; CH-Clinical Administrators; Clinical Administrators; Management Staff; Nurse Managers; Nursing Supervisors/Educators  
**Date:** 7/18/2007 8:03:12 AM  
**Subject:** Capacity Management Report: 07-18-07 @ 0800  
**CC:** Patient Access

Level 0-Green-"Open"; Level 1-Blue-"Pre-Capacity"; Level 2-Yellow-"Impaired"; Level 3-Orange-"Gridlock"; Level 4-Red-"Diversion/On Hold"; Level 5-Purple-"Declared Emergency"

WakeMed Health & Hospitals:

**\*\*\*Raleigh Campus:** \*\*\* Licensed Beds=515, Operating Beds=563, Census=542, Occupancy=98%

**\*\*\*Cary Hospital:** \*\*\* Licensed Beds=114, Operating Beds=128, Census=90, Occupancy=70%

**Rehab Hospital:** Licensed Beds=78, Census=70, Occupancy=90%

**Fuquay-Varina:** Licensed Beds=36, Census=30, Occupancy=83%

**Zebulon/Wendell:** Licensed Beds=19, Census=14, Occupancy=74%

**WMN:** Licensed Beds=0, ED patients awaiting admission=0

Raleigh Campus: No cardiac monitored beds; movement for these requests will improve once DC's begin.

Cary Hospital: PACU flow will be fine.

Raleigh Campus:

**Beds Available=160**

48 vacancies (31=adult; 8=OB/GYN; 4=LDR; 5=Pediatrics), 112 pending D/C's, 11 pending transfers

(plus 5="flexed"; 5="dosed")

**Beds Needed=81**

4 patients (4 adults, 0 child, 0 WMN) waiting in the ED; 4 in-patients holding in the OBS units; 68 scheduled outpatients; 5 at home/other facilities.

Cary Hospital:

**Beds Available=27**

3 vacancies (3=adult; 0=PP; 0=LDR), 24 pending D/C's.

(plus 41="flexed"; 1="dosed")

**Beds Needed=9**

0 ED patients; 9 scheduled outpatient surgeries will need a bed; 0 from home/MD's office.

# Evidence Based Evaluations

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- Evaluate events/drills
  - If in gridlock more than 24 hours
- Department and Incident Command Work Sheets
- Develop After Action Report (AAR)
  - Follow identified actions through completion
  - Incorporate into Environment of Care Emergency Management Program

# Summary

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- Tools to identify and manage capacity and Capability challenges on a daily basis in normal operations or in emergency / disaster events
  - Capacity Management Criteria Matrix
  - Daily Capacity Management Report
  - Department Capacity Quick Response Guides
  - Expansion Space Matrix
  - Emergency Operations Assigned Spaces
- Daily communications to key stakeholders

# Recognition of Other Project Leaders

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Grant Funded Project BT 07-1095

In Collaboration with

North Carolina Emergency Medical Services &  
North Carolina Public Health

Janice Frohman, MHA BSN RN

Administrative Director

Emergency Services

WakeMed Health & Hospitals

Heidi McAfee, MSN BSN RN

Director Patient Access

WakeMed Health & Hospitals



# Questions ?

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For further information, please contact

Barbara Bisset, PhD  
Executive Director  
Emergency Services Institute  
[bbisset@wakemed.org](mailto:bbisset@wakemed.org)

North Carolina Hospital Surge Plan Template

BT Grant Contract # 02076-07