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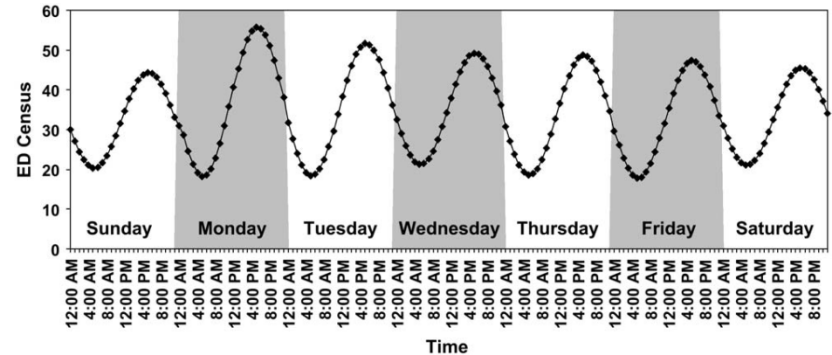
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# The effect of ED crowding on outcomes

# The problem of ED crowding

- ED crowding is a periodic supply-demand mismatch
- Effects
  - Lower satisfaction
  - Delays
  - Errors & Complications
  - Mortality



# An exposure to “crowding”

- Exposure
  - When is the ED at “peak” capacity
  - Ways to measure
    - ED occupancy, census, waiting room number, NEDOCS, EDWIN, others
  - The effect of crowding is longer time intervals
    - Many studies have studied the link between longer intervals and outcomes

# Satisfaction

- Major reason for ED dissatisfaction: long waits
- LWBS is related to long waits
  - Higher LWBS rates during higher episodes of crowding
- ED crowding associated with lower ED satisfaction scores
- People don't forget
  - ED length of stay & hallway placement predict lower OVERALL hospital satisfaction

# Satisfaction

- Are these LWBS patients inconsequential?
- Patients who LWBS are high risk
  - 60% of LWBS patients seek medical attention within one week
  - 11% hospitalized or require emergency surgery

Rowe Acad Emerg Med 2006  
Baker JAMA 1991

# Delays in care

- Pneumonia care
  - More likely to experience delays in antibiotics
    - 31% had abx after four hours during least crowded, 72% at most crowded times
- Pain management
  - More likely to experience delays with acute pain
    - Hip fracture
    - Abdominal pain
    - Back pain
    - Severe pain

# Errors and complications

- High workload is a significant factor in medical errors
- More than 25% of patients have one or more undesirable events while boarding in the ED
- Patients with chest pain 3-5x more likely to have a post-ED complication
- Trauma patients who spend > 6 hours in ED intubated more likely to get ventilator pneumonia

Liu Ann Emerg Med 2009

Horowitz Ann Emerg Med 2009

Pines Acad Emerg Med 2009

Carr J Trauma 2007

# Mortality

- Australian studies
  - Crowding - risk factor 10-day mortality (RR 1.34)
  - Higher ED & hospital occupancy associated with higher 2, 7, and 30-day mortality (HR 1.2-1.3)
- ED LOS > 6 hours associated with higher inpatient mortality in ICU patients
  - 12.9% < 6 hours; 17.4% > 6 hours
  - Differences persist after adjustment

Richardson Med J Aust 2006  
Sprivulis Med J Aust 2006  
Chalfin Crit Care Med 2007



# Is the link ubiquitous?

- Likely no!
- Some populations are unlikely to be harmed by crowding
  - The first few hours of obviously critically ill patients
  - Difference is harm by hospital
- Multi-center studies are needed
  - NHAMCS may be potentially used to demonstrate the risks of crowding