Managing Queues: Door-2-Exam Room Process
Mid-Term Proposal Assignment

Concept/Objectives

Children’s Healthcare of Atlanta (CHOA) has plans to build a new facility that will be over 200,000 sq. ft., and they are looking for models of care and recommendations for facility planning that are based on and informed by research. These ideas would be introduced at the new facility, and application of some/many of these recommendations would be considered for existing locations depending on need, feasibility, and/or cost. After touring two of the urgent care facilities within the CHOA organization, it became evident that many of the processes and front-end operations of these facilities share several commonalities with those found at a typical emergency department. Some exceptions to this comparison include: urgent care rarely has patients presenting with emergent conditions, emergent acuity-levels are transferred to an emergency department, and urgent care facilities do not operate 24 hours a day. The five locations use the same processes for delivering care; however, there is an indication of wide variations within each facility and between different locations regarding the length of waiting from the time a patient enters the door of the facility until they are placed in an exam room (based on a small sampling of posted wait times). Posted wait times varied from 15 minutes up to 2+ hours, and all five locations were subject to this range of wait times; some locations experienced higher wait times more often than other locations. The differences could be explained by variations in arriving volumes, staffing resources, spatial organization of key spaces, and/or the possibility that processes are not being applied consistently or in the same manner at each location.

Investigating the queues within the processes at each location to uncover bottlenecks in the system will likely provide insight into these varying ranges of wait times as well as lead to improvement recommendations and innovative solutions that may increase efficiencies and reduce wait times. Some goals for the overall project include:

- Manage/improve queues in the urgent care process.
- Improve patient flow & minimize movement between functions and/or the waiting area.
- Remove waste within the front-end operations in terms of Lean design.
- Reduce wait times in order to get the patient in front of a physician/provider more quickly.
- Decrease LOS (length of stay) and LWBS (left without being seen).
- Increase parent, patient, & staff satisfaction.

Research Methodology (tasks completed)

Site Tours: Initial site visits were conducted at both Forsyth and Satellite Blvd. to gain a better understanding of processes, procedures, and spatial layout as well as to ask related questions of a CHOA representative.

Sample of Posted Wait Times: posted wait times data was extracted from the CHOA website for approximately five different days to see if any patterns exist for each site as well as between sites: Monday, Wednesday, Friday, Saturday, and Sunday. This information was organized into a color-coded chart for quick review and intuitive understanding.

Literature Review: Several research activities have been and will be employed, beginning with current literature on topics such as ambulatory clinics and urgent care, pediatrics care processes, best lessons from emergency department design, ED throughput and front-end operations, Lean design, queuing theory, information technology in healthcare, and evidence-based design. Information on discrete event simulation and other modeling/simulation tools has also been sought to investigate means to study patient flow through current processes as well as the impact that process changes and spatial modifications may have upon the system. Journal articles are the primary resource, with information also being acquired from textbooks on various subjects that were written by known experts in the field. These resources have been reviewed for solutions and their potential application to an urgent care center.

Observations: Impromptu visits to both Forsyth and Satellite were conducted during periods when wait times at each site had reached 2+ hours in order to observe the door to triage sequence and how patient flow was handled at check-in, registration, and triage. This was done to determine if any bottlenecks were occurring at these steps when patient volumes are high. Tasks were also timed as a means of examining the efficiencies of those functions.

Historical Data Requested: Past data has been requested for wait times posted online since the inception of this initiative in September 2013 to see if any patterns exist for each site as well as between sites with regards to time of day, day of the week, and/or special occasions/events. Additional information for the same period of time will be sought for each location that includes: patient arrival patterns by time/day, patient age distribution, presenting conditions and acuity level percentages, and staffing resources/schedules, length of stay, and left without being seen.
**Research Methodology** (tasks pending)

**Data Management Methods:** Observe how information is collected from patients and organized/managed throughout front-end operations to better understand the current utilization of information technologies.

**Time-Motion Studies:** The individual tasks that occur at each point in the process as well as minimum, average, and maximum time taken to complete those tasks will be measured and recorded. This information will be used to create a current state process map as well as aid in identifying the underlying reasons for any bottlenecks that may exist.

**Findings/Analysis**

**Queues:** Urgent Care Centers are similar to EDs in terms of the unpredictable nature in which patients arrive. Several queues have been identified in the patient care delivery system for both ambulatory service lines through literature reviews and on-site observations. Research indicates that two of the main queues between the front door and seeing the doctor are registration and triage/assessment. Other important queues include check-in, ancillary services (imaging and lab work), fast-track, exam/treatment rooms as well as physicians/providers, nurses, and technicians. Some of these queues/servers are linked, making the queue more difficult to manage as long they are coupled (needing to be available at the same time). Other suggestions for managing queues will be applied to the project, which includes:

- Reduce number of queues
- Reduce time in queues
- Reduce movement between queues
- Look for bottleneck server(s)
- Pooling servers
- Concurrent/parallel activities
- Segmenting flow (Shriver & Eitel, 2011)

**Observations:** Initial observations at both urgent care locations indicate that bottlenecks during long wait times are not occurring during check-in and registration, and that they are likely occurring downstream of assessment/screening (and may even include this step). Turnaround times in ancillary services may be one source for delays, but further investigation is needed to determine if these could be alleviated by placing order sets and using point-of-care testing during the assessment phase. The two sites had a different layout for fast-track, and there appeared to be some differences in how/when they utilized it. Managing these queues and improving patient flow through them will be important to reducing wait times and improving throughput.

**Design Objectives, Criteria and Specifications**

Two sequences with related queues have been identified for the project: door-2-assessment and assessment-2-exam room. Multiple solutions will be offered to improve efficiencies within these sequences as well as overall wait times.

**Door-2-Assessment:** Even though the check-in and registration queues are not bottlenecks in the system, creating a more efficient system would provide opportunities for reallocating staff to other areas/tasks, improve parent and patient satisfaction by providing more conveniences within the process, and streamline tasks within these functions to improve efficiencies. Success for developing and implementing an online pre-registration system, lobby kiosks, health ID Card program, and streamlining check-in/registration processes could be measured by observing how long tasks take to complete and what “waste” has been removed from the process as well as by patient satisfaction scores related to convenience that has resulted from those improvements.

**Assessment-2-Exam Room:** During site observations, there were differences in how/when assessments were made and how fast-track was utilized. It became apparent that there may be some lost opportunities to start diagnostics earlier in the process and to move low acuity patients through faster without their needing to go into the clinical area. Based on research, fast-tracking patients through more quickly can also improve wait times for ill/injured patients who may require more diagnostics and treatment time. Because cultural changes modifications to the current process would be required, administrative support and staff buy-in would be important. Past wait times, length of stay, and leaving without being seen bench marks can be compared to the new data after improvements have been made to the process and built environment in order to determine how successful changes were in reducing waiting times.
**Concept Development**

The concept of managing queues in the door-2-exam room process evolved from identifying existing needs during the site visits to both Forsyth and Satellite Blvd and through research on emergency and urgent care processes. After reviewing posted wait times for several days for all five urgent care locations, it became clear that more efficient measures needed to be sought in light of the wide variations in wait times from door to exam room. Potential solutions for managing patient flow through queues and reducing “waste” within the system were uncovered through research.

**Detail Design Development**

The design process for the project began with an initial site visit to learn about care processes and space utilization at Children’s Urgent Care facilities. Detailed notes were taken on the process, technology, and spatial layout. Since the patient flow through the system appeared to be similar to emergency department processes, this initial step was followed up with an extensive literature search on ED throughput and front-end operations, Lean design, queuing theory, information technology in healthcare, best lessons from emergency department design, and evidence-based design as well as ambulatory clinics, urgent care centers, and pediatrics. Photographs and floor plans were acquired, and both were reviewed against notes taken during site visits. Analyzing the data gathered was the next step to understand the process from the patient experience, recognize the multiple steps involved in the process, and to identify multiple queues within the system. This led to the creation of two diagrams (see attachments):

- **Process Mapping**: A generic process map was created for the current door-2-exam room process to show steps in the process and alternative pathways that may occur depending on clinical, patient, and site variables.
- **Touch Points**: Touch points were identified for front-end operations and located on the floor plans for the two urgent care sites visited.

Wait times posted online by CHOA for all five locations was extracted and placed into a color-coded chart to determine if any patterns existed. This lead to an awareness of the variations between different times of the day and each day of the week within a site as well as variations between the five locations. The wait times would vary between 15 minutes to 2+ hours, and some sites have long wait times more often than others. Since all locations use the same process, data is still being collected to uncover what may be causing many of these variations:

**Decisions/Proposed Solutions**

A menu of potential solutions was created using ideas discovered through research journal articles, books on emergency department design, and current practices. Some of these include:

**Reduce Wait Times**
- **Reduce number of queues**: will combine queues.
- **Reduce time in queues**: create efficiencies through pre-registration and data management.
- **Reduce movement between queues**: reduce number of queues, utilized shared spaces and resources, locating all ancillary services together, and improve spatial layout.
- **Look for bottleneck server(s)**: downstream of assessment.
- **Pooling servers**: combining queues and overlapping staffing resources.
- **Concurrent/parallel activities**: pre-registration, waiting and order sets/point-of-care testing, and fast-tracking “vertical” patients needing minimal to no ancillary services.
- **Segmenting flow**: create two patient care streams by sending higher-acuity going into clinical areas and treating lower-acuity patients in a “see-n-treat” area. A third stream could be created during flu season by utilizing adjacent spaces in Specialty care.

**Door-2-Assessment Sequence**: Numerous solutions have been proposed to improve the efficiencies of this sequence: health ID card, pre-registration capabilities, and check-in/registration kiosks in the lobby of the facility. More details are available in the supplemental proposal.

**Assessment-2-Exam Room Sequence**: Numerous solutions have been proposed to improve the efficiencies of this sequence: use of patient streaming to segment flow through the care process, creation of an express care area with dedicated provider(s) with “see-n-treat” capabilities, enhanced information technologies, improved implementation of order sets and point-of-care testing, and shared resources, space, and technology. More details are available in the supplemental proposal.
Forsyth Current Door-2-Exam Room Layout

1. Pre-Register & Arrival Sequence: Number Board & Wayfinding
2. Door-2-Triage Sequence: Check-In/Register & Waiting/Movement
3. Triage Sequence: Start-2-Start
4. Triage-2-Exam Room Sequence: Diagnostics & Results Waiting

Note: Front-end operations fairly compact.
Children’s Urgent Care Touch Points
Emerging Ideas & Design Opportunities

Satellite Blvd. Current Door-2-Exam Room Layout

1. Pre-Register & Arrival Sequence: Number Board (?) & Wayfinding
2. Door-2-Triage Sequence: Check-In/Register & Waiting/Movement
3. Triage Sequence: Start-2-Start
4. Triage-2-Exam Room Sequence: Diagnostics & Results Waiting

Note: Front-end operations not compact.