LEARNING FROM THE PAST: TWO INFUSION CENTERS INFORM A NEW DESIGN

SIGNIFICANCE
Each year, approximately 650,000 cancer patients receive chemotherapy in outpatient oncology clinics (i.e., infusion centers) throughout the United States (CDC, 2018). Infusion centers have become important settings in which patients receive life-saving cancer treatment.

Literature on outpatient infusion settings is scarce (Kamimura, et al., 2012) and few studies have considered both staff and patients’ points of view. Considering there is limited studies on these settings, this research serves as baseline benchmarking data for comparison with other studies on cancer infusion centers, in addition to informing future infusion center designs.

PURPOSE
This study compared staff workflow, communication and collaboration, and staff and patient satisfaction with multiple aspects of two cancer infusion centers—an open bay design and a semi-private bay design—both located on a regional medical center campus in the eastern United States. An additional goal of the study was to gather baseline data for comparison in a future post-occupancy evaluation of a new infusion center that will replace the existing infusion centers studied.

SETTING
The 3,220 SF open bay infusion center in the study was an older unit, built in the mid-1990s, with 19 infusion chairs and two private bed treatment rooms. The semi-private unit, opened in 2015, was considerably larger (5,720 SF) and was comprised of 21 3-sided infusion bays and one private treatment room. A dedicated space for two embedded pharmacists was provided in the semi-private design. Medications were prepared remotely and delivered to the open bay center.

METHODS
A mixed-method approach was used in the study and included staff shadowing, and staff and patient surveys. Observers recorded nurses’ locations on each unit, time spent, and activities performed for a total of 34 hours during site visits in November and December, 2018. Shadowing (8.5 total hours) also was used to assess the process of medication delivery on the units.

Staff satisfaction with aspects of each center’s layout and workspaces, and perceptions of patient privacy, communication, and collaboration were evaluated using a questionnaire primarily comprised of closed-ended, 5-point Likert-type questions. Using a similar format, patient questionnaires gauged satisfaction with unit layout and space, wait time, privacy, interactions with staff, and staff surveillance. Paper-based questionnaires were distributed by nurses to patients of the infusion centers during the data collection period (November and December, 2018).

Finally, to collect data regarding the visual characteristics of each infusion center, the research team used a plan of each center to measure nurses’ visual access from their workstation to patients in treatment bays. The result of the measurements was reported as the square footage of visible area from each individual workstation. These calculations were completed using Rhinoceros 5’s Grasshopper plug-in.
RESULTS

Comparison of shadowing data indicated no significant difference in the time spent by nurses in different areas in the two centers. Findings showed that, on average, nurses spent 39.5% of their time in infusion bays (p=0.5), 38% in nurses’ station (p=0.7), and 8.5% in med room (p=0.1).

In addition, there was no significant difference in the total number of visits to various areas on the unit (205 visits in the open bay design vs 197 in the semi-private design). However, nurses in the open bay design visited the nursing station 27% more frequently. Open bay nurses were also observed washing their hands (p=0.003) and retrieving supplies (p=0.05) more frequently compared to nurses in the semi-private design.

SATISFACTION

Overall, staff in the open bay design were 11% less satisfied with the amount of work surface and storage space, proximity to patients, speech and visual privacy, along with ability to concentrate without distraction compared to staff in the semi-private design.

However, staff in the open bay design were 20% more satisfied with visual access to patients.

COMMUNICATION

Communication in both centers mostly occurred in the nurses’ station (average 68 minutes) followed by infusion bays (average 48.33 minutes) and the medication room (average 7.36 minutes).

There was a significant difference between the two units in the amount of times nurses communicated with patients and visitors from the nurses’ station between the two units (9.3 minute in open bay versus 0.7 minutes semi-private bay, p<0.05).

This difference could be explained by the proximity of the nurses’ workstation to the infusion chairs in the open bay design.

DELIVERY OF MEDICATIONS

Overall, staff satisfaction with proximity to pharmacists (6%), and proximity to other caregivers (8%) was higher while working at the nursing stations in the semi-private bay unit where the pharmacy is located within the center and a pharmacist sits in the nursing station.

A pharmacists noted “It is a positive experience to be in the treatment suite, but it is difficult to focus or have private conversations.”

WORKFLOW

Researchers gleaned several design insights from the study results:

- Design nursing stations and infusion bays to maximize nurse performance, as these are areas where staff spend almost 80% of their time.
- Provide spacious infusion bays and workstations, with enough space to store supplies and medical equipment, to increase nurses’ satisfaction and reduce the need for multiple trips to retrieve supplies, thereby increasing efficiency.
- Nurse workstations should facilitate privacy and the ability to concentrate on tasks that require focused concentration as well as providing for monitoring of patients in infusion areas.
- Accommodate a collaborative working environment among infusion center staff including nurses, pharmacists, and pharmacy technicians to increase operational efficiencies and improve communication.
- Create a balance between patients’ visual and auditory privacy and visibility to staff.
- Locate medication rooms in a separated area of the infusion bay to allow for nurses to prepare medications without distraction.
- Embed a pharmacy within the infusion center, with a mechanism to alert nurses when medications are ready, to increase efficiency of medication delivery.

POST OCCUPANCY EVALUATION

The baseline data gathered through this study will be compared to data generated from a post-occupancy evaluation (POE) of a new infusion center being developed on the same medical campus, which is scheduled to open in 2020. The new center is designed with five infusion pods, each with 10 semi-private bays with chairside charting, two private rooms, embedded pharmacists, and a nursing station. An embedded pharmacy is positioned in the center of the five pods. An important goal of the POE will be to assess the influence of design decisions, informed by this case study, on activity and workflow patterns, as well as satisfaction.