

# Chemotherapy Wait Times in a Network of Pediatric Oncology Clinics

Mohamed Elsaid, MD,\* Jennifer Morgan, RN, MSN,†  
 Natalia Colorado, MD,‡ Jennifer Woolsey, RN,\* Natasha Canterberry, RN,‡  
 Patricia Rice, RN,§ and Carolyn Russo, MD†

**Summary:** Patient satisfaction with medical care delivery is an important aspect of value-based health care. Providers strive to provide optimal patient satisfaction. Among a network of ambulatory pediatric oncology affiliate clinics, we conducted patient satisfaction surveys and found that the lowest scores were related to delays in the administration of chemotherapy. To address this shortcoming, we used continuous improvement methodologies to reduce the delay in chemotherapy administration in 3 affiliate clinics. To evaluate the efficacy of the quality improvement interventions implemented at each affiliate clinic, we measured the time from patient arrival to the start of chemotherapy administration over a 2-week period before and after the interventions. Wait times for chemotherapy administration were reduced in each clinic by 7% to 15%, exceeding the preestablished goal of a 5% reduction without affecting patient safety. Patient satisfaction for chemotherapy wait times was also marginally increased. In conclusion, implementation of quality improvement interventions across a clinical network can improve specific aspects of patient satisfaction, thereby improving the overall patient experience.

**Key Words:** chemotherapy administration, hospital affiliates, pediatric cancer, quality improvement

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Optimizing health care delivery improves satisfaction for patients, providers, and health care administrators.<sup>1,2</sup> Inefficient clinic flow can increase health care costs, as clinic staff are more likely to accumulate overtime hours. Inadequate use of clinic time may lead to fewer open appointment times, decreasing the availability of clinic visits and creating longer wait times for new patient referrals. Prolonged wait times often result in patient dissatisfaction.<sup>3–5</sup> In turn, patient dissatisfaction may negatively affect the morale of health care providers.<sup>6</sup>

Patient dissatisfaction is not an issue in a vacuum, and the health care industry is more vulnerable to this challenge than

are other industries. For example, in the airline industry, prolonged wait times in the form of flight delays are universally dissatisfying for customers. However, despite customer dissatisfaction, the outcome (ie, customer arrival in the designated city) is not critically affected. In contrast, patient dissatisfaction in the health care industry may yield unfavorable health care outcomes, which can be detrimental for patient health and quality of life. Jha et al<sup>7</sup> showed a positive correlation between positive patient satisfaction surveys and clinical adherence to care guidelines. Therefore, improving clinic efficiency may not only boost patient satisfaction but also improve health care outcomes by increasing adherence to medical advice.

In our network of ambulatory pediatric oncology clinics, the lowest scores in patient satisfaction surveys occurred in the category of wait times for chemotherapy. Therefore, we developed a quality improvement project to reduce wait times for patients receiving outpatient, laboratory-dependent, intravenous push chemotherapy by 5% (ie,  $\geq 10$  min reduction in wait time) within 4 months. Our goals were to improve patient satisfaction, enhance clinic efficiency, and boost staff morale without negatively affecting patient safety.

## MATERIALS AND METHODS

The Affiliate Program at St. Jude Children's Research Hospital (St. Jude) is a network of collaborating institutions working toward a common goal of finding cures and saving children. The quality improvement project was a joint initiative among 3 of the 8 St. Jude affiliate clinics in Huntsville, AL; Springfield, MO; and Tulsa, OK. Each ambulatory affiliate clinic is organized within a health care system that provides laboratory support and pharmaceuticals for clinic patients. The affiliate clinics care for hematology and oncology patients, obtaining laboratory samples and providing examinations and infusional therapy (ie, chemotherapy, blood products, antibiotics, and antibody therapies). The clinics operate between 8:30 and 4:30, Monday through Friday. Two clinics treat an average of 12 patients per clinic day and have 2 pediatric hematology-oncology physicians on staff. The other clinic treats an average of 20 patients per clinic day and has 3 pediatric hematology-oncology physicians on staff. The clinic teams consist of a team leader (ie, the nursing director of the Affiliate Program) and core members at each site (ie, an affiliate physician, a nurse educator, and a pediatric pharmacist). During the study period, each clinic team met weekly in person, and the network of 3 clinics met monthly via teleconference. We used a Plan-Do-Study-Act methodology for this improvement project. The initiative focused on patient populations scheduled to receive intravenous push chemotherapy, which was dependent on laboratory test results before administration. The measures

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From the \*St. Jude Affiliate Clinic, Mercy Children's Hospital—Springfield, Springfield, MO; †Affiliate Program Office, St. Jude Children's Research Hospital, Memphis, TN; ‡St. Jude Affiliate Clinic, Huntsville Hospital for Women and Children, Huntsville, AL; and §St. Jude Affiliate Clinic, The Children's Hospital at Saint Francis, Tulsa, OK.

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Reprints: Carolyn Russo, MD, 262 Danny Thomas Place, MS-722, Memphis, TN 38105 (e-mail: carolyn.russo@stjude.org).

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**TABLE 1.** Interventions to Reduce Chemotherapy Wait Times for Each Clinic

Clinic*	Most Cited Concerns	Interventions
A	Waiting for laboratory test results	Arranged nurse assignments to have laboratory collections performed earlier in visit
	Waiting for providers to sign chemotherapy orders	Alert system to notify the provider when laboratory test results available
B	Waiting for laboratory test results	Move laboratory collections to beginning of visits
	Waiting for chemotherapy to be delivered to the clinic	Write pending orders in advance to alert pharmacy staff
C	Waiting for approval of chemotherapy orders with multiple providers	Status board for providers to display when laboratory result is done

\*Affiliate clinics are coded for anonymity.

included analyses of chemotherapy wait times, patient satisfaction, staff satisfaction, and medical error reports before and after the quality improvement initiative.

Each clinic team created an individual process flow map for chemotherapy administration that incorporated all stakeholders: patients, patient registration staff, triage nurses, providers, chemotherapy nurses, and pharmacists. The process flow maps defined the baseline process, starting with patient arrival times and ending with chemotherapy administration. We determined the time points for data collection from the process flow maps. The process flow maps were also used to create cause-and-effect diagrams which evaluated possible solutions and opportunities to improve chemotherapy wait times. By using the categories identified from the cause-and-effect diagrams, each clinic team polled all clinic physicians, nurses, and pharmacists to

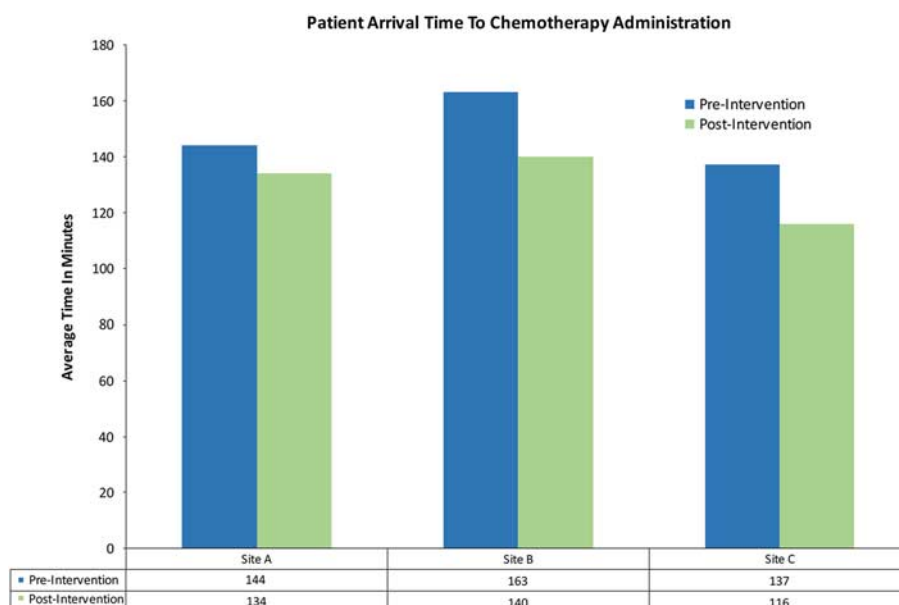
determine which factors were perceived by clinic staff as the most problematic. This information was analyzed in a Pareto chart which guided the interventions. Each individual clinic team developed interventions according to the feasibility of implementing the intervention in its practice setting. The interventions differed for each clinic (Table 1).

A preintervention time evaluation was performed over a 2-week period in each of the 3 clinics and a postintervention time evaluation was performed 4 months later over a 2-week period. Each clinic had a nurse educator who collected and electronically reported the data to the team leader. The following time stamped data included: (1) patient arrival time, (2) laboratory collection time, (3) laboratory result time, (4) chemotherapy order time (ie, time the physician approved the chemotherapy administration), (5) chemotherapy delivery time to clinic, and (6) chemotherapy administration start time. Patient satisfaction in ambulatory clinics was measured by using the Press Ganey Outpatient Oncology survey tool,<sup>8</sup> consisting of 9 surveyed areas, with the specific category of “wait time in the chemotherapy area” as the measure to evaluate. A balance measure of staff satisfaction before and after the intervention was also included. Patient safety was evaluated by reviewing medical error reports in the same preintervention and postintervention periods. The 3 clinic sites were coded as “A,” “B,” and “C” to ensure institution anonymity. The time analyses from clinic site B were assessed with a statistical process control x-chart.<sup>9</sup>

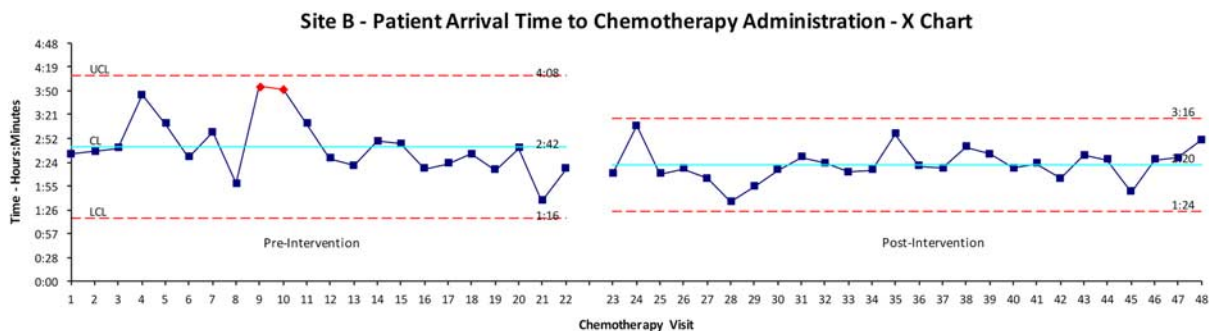
## RESULTS

### Time Analysis

The time from patient arrival to the start of chemotherapy administration was collected at each clinic before and after the interventions. In addition, the time of each segment of the process from start to finish was collected. Within 4 months of the interventions, all sites had a reduction in chemotherapy wait times (Fig. 1). The time to chemotherapy administration



**FIGURE 1.** Mean time from patient arrival to chemotherapy administration start. Times for each affiliate clinic are shown during the preintervention (blue) and postintervention (green) periods.



**FIGURE 2.** Actual times from patient arrival to chemotherapy administration start for affiliate site B in the preintervention and post-intervention periods. Upper and lower confidence limits are indicated by dashed red lines.

at site A decreased from 144 minutes preintervention to 134 minutes postintervention. The time to chemotherapy administration at site B decreased from 163 minutes preintervention to 140 minutes postintervention. The time to chemotherapy administration at site C decreased from 137 minutes preintervention to 116 minutes postintervention. Each clinic exceeded its target goal of a 5% reduction within 4 months. Clinic B demonstrated the largest reduction in time, which had a target goal of 155 minutes (Fig. 2).

**Patient and Staff Satisfaction**

Patient satisfaction scores in the category of “wait time in the chemotherapy area” were reviewed before and after the intervention. Although the scores increased from a mean score of 75.7 (n = 38) before the interventions to a mean score of 85.6 (n = 47) after the interventions, this difference was not statistically significant (P = 0.08). Nurses in each clinic were asked by survey whether the interventions negatively or positively affected their work environment and their job satisfaction. Each nurse scored the interventions in their clinic as very helpful and remarked that the interventions had a positive influence on their job satisfaction.

**Patient Safety**

Patient safety data, measured by medical error reports, at each site showed no increase in chemotherapy administration–related adverse events. Specifically, no adverse events related to chemotherapy administration were reported during either of the preintervention and postintervention periods.

**DISCUSSION**

We developed a joint quality improvement initiative to reduce the wait times in the chemotherapy areas in a network of pediatric oncology clinics for children receiving laboratory-dependent, intravenous push chemotherapy. Within 4 months, we reduced wait times by 7% to 15% in each clinic (ie, a 10 to 23 min decrease), exceeding the target goal of 5%. Patient satisfaction scores increased in this specific metric, clinic staff reported improved job satisfaction, and medical errors did not increase.

Each clinic specifically focused on the weaknesses that were the easiest to implement within its control. For example, site A elucidated that waiting for laboratory test results and subsequent chemotherapy order approvals were its key weaknesses to address. This clinic reduced overall chemotherapy wait times by moving the laboratory collection to an earlier time during patient encounters and created an alert system to notify providers when laboratory test results were completed. Site B also noted that waiting for

laboratory test results caused delays, but an additional delay resulted from waiting for chemotherapy to be delivered to the clinic from the pharmacy. This clinic likewise moved the laboratory collection to an earlier time during patient encounters. Although the clinic could not increase the number of staff to deliver the therapeutics, it provided the pharmacy staff with advanced notice of upcoming orders, which improved the delivery time from the pharmacy. Site C noted that its greatest area of delay was waiting for approval from assigned providers to administer chemotherapy. This clinic created a status board to alert providers when the laboratory test results were completed. The staff found this system provided a visual reminder to providers that the laboratory results were available and led to fewer delays. Alert systems are not unique in this situation. Kallen et al<sup>10</sup> reported a 15% decrease in wait times for scheduled oncology appointments by using measures to alert oncologists that chemotherapy orders were ready to sign and by providing pharmacy staff with earlier notification when patients were ready to receive chemotherapy.

We found working within a network of similar clinics was beneficial. Although the internal processes varied at each institution, the 3 clinic teams explored a wider option of potential mechanisms to improve clinic flow by sharing experiences. The clinic teams reviewed each of the Pareto charts from all the clinics during regular conference calls. During these calls, the 3 teams discussed what interventions they had tried and ideas they were considering. One clinic described a previous experience of moving laboratory collections to the beginning of patient encounters after registration and before the nursing assessments. The other 2 clinics organized their clinic flow to replicate this strategy, and each showed improvement in this segment of the process. One clinic had developed a system to notify providers when laboratory results were ready by placing an alert on the provider’s office door. The other 2 clinics adopted this strategy in different ways that worked in their clinic flow. One used electronic medical records to create a direct notification, and the other developed an electronic status board in the physician work space to notify providers when laboratory results were complete. One clinic notified the pharmacy staff a week in advance of pending chemotherapy orders. Another clinic, which was dependent on delivery of chemotherapy from another unit, implemented this strategy. They found sharing pending orders with pharmacy staff helped the pharmacy staff prepare their work flow in advance.

Our framework to reduce wait times in ambulatory pediatric oncology clinics is not dissimilar to approaches suggested by other groups. Loving and colleagues proposed an examination of process flow maps in a radiology practice

to identify bottlenecks in clinic flow. They identified solutions by using the process flow maps to reduce variability and decrease wait times.<sup>11</sup> They also recommended notifying patients of expected wait times to increase transparency in the process. Soeteman et al<sup>12</sup> used a patient flow analysis to understand wait times in a pediatric ambulatory clinic, which increased accessibility and patient satisfaction. They also recognized that providing a positive environment (eg, toys and play activities) during wait times improves the perception of wait times. Our study did not specifically evaluate environmental factors; however, these factors are likely to be useful in pediatric oncology clinics.

Another approach to reducing chemotherapy wait times is to dedicate staff for chemotherapy infusions for select patients (ie, children who are clinically well) and have laboratory testing in advance.<sup>6</sup> This approach is likely to be successful in larger centers. In our network of smaller ambulatory pediatric oncology clinics, this system was not feasible because the number of nurses at each clinic was insufficient for this approach.

Staff were surveyed after the interventions were implemented. The nurses relayed that the interventions decreased the backlog of patients waiting to receive chemotherapy. Several nurses commented on how the improved clinic flow positively affected their job satisfaction. They appreciated the improvements to reduce wait times and, that, in turn, helped them care for patients more efficiently.

Patient satisfaction was marginally improved after the interventions. The surveys are ongoing and may reveal significant improvements over time. Improved patient satisfaction may reflect greater clinic efficiency and may affect patient adherence to treatment and thus outcome. Oncology patients who are more satisfied with their care report less negative social and emotional effects.<sup>13,14</sup> One study of patients with breast cancer demonstrated that satisfaction with medical service is an independent predictor of survival.<sup>15</sup> In a multivariate analysis, Jacobs et al<sup>16</sup> showed that improved patient satisfaction is the most robust predictor of adherence to oral chemotherapy for medical oncology patients. Lower adherence rates with oral 6-mercaptopurine are associated with increased relapse risk in children with acute lymphoblastic leukemia.<sup>17</sup> Therefore, improving satisfaction with care may positively affect outcomes for children with cancer.

In conclusion, each affiliate clinic in the network reduced chemotherapy wait times by using interventions specific to their clinic processes. Moreover, each clinic benefited from being part of a network, which facilitated sharing and learning from colleagues.

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