Designing an Acuity Tool for an Ambulatory Oncology Setting

Julie DeLisle, RN, BSN, MSN, OCN®

Staffing needs in an ambulatory oncology infusion setting can be challenging. The workload of nurses and time required to provide patient care are increasing. With the addition of new targeted therapies and complicated treatment regimens, increased patient acuity should be considered when determining daily staffing. This article describes the development of an acuity tool based on the complexity of patient treatments. The first part of the process focused on development of the tool and data collection during a two-month period to assess the complexity of patient treatments. The second part used the tool to determine daily staffing for infusion rooms. The tool provides a better representation of acuity in infusion rooms by connecting the complexity of patient treatments with staffing on a daily basis. In addition, the tool is easily adaptable to changing oncology treatment regimens because it provides a basis for assessing treatment complexity in the infusion room.

Determining staffing needs can be challenging because the workload of nurses and the time required to provide patient care depend on multiple factors, including patient characteristics such as age, comorbidities, current non-oncology medications and treatment regimen; nurse competency; differing physician practices; and the volume of patients requiring care. Given the variables, providing appropriate staffing patterns is critical for the delivery of optimal patient care.

In 2001, the Oncology Nursing Society (ONS) examined staffing issues by surveying nurses and nurse executives about their practice settings, perceptions on staffing, budgeting, and remedies to cope with staffing in a two-part series (Lamkin, Rosiak, Buerhaus, Mallory, & Williams, 2001, 2002). Differences in staffing outpatient and inpatient settings were observed. Respondents (N = 494) believed that hospital stays were shorter, the amount of paperwork for nurses had increased, and patient acuity had risen. Outpatient nurses reported caring for more patients and having more delegated tasks than inpatient nurses. Differences also were found between nurse executives and nurses regarding actual and perceived staffing and quality of care. Almost all respondents believed that too few nurses are providing care in the United States.

In 2004, ONS completed another survey of its members to determine aspects of care for nurses who were practicing in ambulatory care and office settings (Ireland, DePalma, Arneson, Stark, & Williamson, 2004). Key issues related to practice, such as staffing and safety that needed to be addressed, also were identified. Respondents (N = 325) confirmed that ambulatory or office nurses are faced with increasingly complex clinical care environments and have a broad range of responsibilities. More than 80% of respondents did not use any kind of patient acuity assessment to assist with staffing decisions; instead, they

At a Glance

✦ Establishing and using an acuity tool that represents the complexity of patients fosters the equitable distribution of nursing staff and increases nurse satisfaction.
✦ Continual evaluation and revision of the tool are important as treatments and the environment change.
✦ A well-formulated acuity tool with information continually being collected and maintained can assist with a variety of decisions, including rearranging existing and hiring new staff.

based staffing on patient volume and number of treatments provided.

The purpose of this article is to describe the development of an acuity tool for staffing based on the complexity of patient treatments in an ambulatory oncology setting. The desired outcomes of the implementation of the tool were to improve use of nursing resources and to increase nurse satisfaction and retention.

The ambulatory oncology setting discussed in this article is a large, private oncology practice. At the time of the development of the acuity tool, the practice included 11 clinics across southeastern Wisconsin. Sixteen practicing physicians and approximately 60 nurses, including an internal float pool of 5 nurses who worked throughout the 11 clinics, served patients...
in hematology and oncology. Each clinic was open Monday 
through Friday, 8 am to 5 pm. Together, the clinics scheduled
750–800 patient appointments every day. Prior to implementa-
tion of the acuity tool, patient appointments were assigned using 
a computerized system that produced a schedule for each area
of the clinic. The patients were scheduled with a “chair time”
(the estimated length of time to administer the medication) or 
a follow-up appointment (the time allotted for a visit with the 
physician) scheduled every half hour according to the number 
of nurses at a particular clinic.

Each clinic had a similar physical arrangement. All clinics con-
sisted of a reception area, a laboratory, the team area where the 
physician(s) sees patients, a medical records department, and an
infusion room that included a pharmacy with a pharmacy tech-
nician who prepared the treatments. In the reception area, one 
or two receptionists greeted patients, verified insurance, and 
checked patients in for the day. In the laboratory, a phlebotomist
drew blood from patients and the medical laboratory technician 
rang necessary tests. The team area included a medical secretary, 
medical assistants, nurses, and a nurse practitioner or physi-
cian assistant. The medical assistants prepared patients for the 
healthcare provider by taking vital signs and a brief patient his-
tory. The medical secretaries scheduled patient appointments 
and any procedures or tests. The nurses triaged phone calls, 
assessed patients, and reviewed any patient concerns with the 
physician. The nurse practitioner or physician assistant worked
closely with the physician by seeing patients in the clinic and in 
the hospital, depending on physician preference (see Table 1).

Most patient care occurred in the infusion room. Patients could 
be seen in the infusion room for a number of reasons, including
phlebotomies; vitamin B12 injections; injections of red cell or 
white cell stimulating growth factors; chemotherapy treatments;
blood sampling from implanted ports; and nurse checks, which 
include assessment of patients and laboratory results. A total of
approximately 250 patients were seen each day in infusion rooms,
with the volume of patients in one clinic ranging from 10–70 de-
pending on the size of the infusion room and the number of phy-
sicians at the clinic that day. The number of nurses assigned per
infusion room varied from one to six depending on the patient 
volume of the clinic. The infusion room nurses were responsible
for assessing and educating patients, starting IVs, administering 
medications, and ensuring physician orders were implemented.

In the infusion rooms, patients were not assigned a specific 
nurse, rather they were given a scheduled time and were cared for 
in the order they presented. Patients’ conditions and treatment 
needs and nurses’ work styles and speed determined the number of patients nurses cared for on a given day. This posed 
a challenge for staffing the clinics, particularly when patients 
were not classified by acuity.

Traditionally, hospitals used nursing classification systems 
to forecast the number of nurses required for patient care on a 
daily basis (Swan & Griffin, 2005). The systems typically group 
patients into categories that reflect the required nursing care 
time, which provide a more accurate approach to determining 
the needs for nurse staffing.

Two types of nursing classification systems have been used 
in inpatient settings for staffing: the prototypical method and 
the factor classification (Cusack, Jones-Wells, & Chisholm, 2004; 
Haas & Hackbarth, 1995; Swan & Griffith, 2005). The prototypical-
cal method evolved from the triage process performed by nurses 
to prioritize patients by care required. The scales typically have 
three to five levels of acuity, with higher levels reflecting more
nursing time; and include a brief profile of patients’ needs associ-
ated with each level. Patients are assigned to the broad category 
that best describes their care needs. The method relies on the 
judgment of the nurse assessing the level of acuity and, there-
fore, is somewhat subjective. Although the method primarily 
has been used in hospitals, it can be effective in an ambulatory 
care setting because nurses already are comfortable with triage 
and assigning levels of care (Haas & Hackbarth).

Factor classification, the second type of nursing classification 
system, is considered more objective. The approach uses specific 
descriptors of the patient care process that are most visible and 
correlates them with the amount of time allocated to patient care. 
Each descriptor is evaluated independently by nurses before com-
bining the descriptors to determine a category for a particular 
patient (Hoffman & Wakefield, 1986). For example, nurses check 
off the descriptors listed on the tool for each patient in their care.
The number of descriptors, including their time allocation, is to-
taled and patient acuity level is assigned. A limitation of this type 
of classification is that the acuity can be manipulated if the nurse 
checks more intensive descriptors (Haas & Hackbarth, 1995); pa-
tients are assumed to be more acute because of more descriptors 
required. Overall, both types of classification systems can work 
effectively. The important decision is to find the type that best 
fits the environment in which it will be used.
The first published research on activity categories in ambulatory care nursing was completed by Verran (1986). The Ambulatory Care Client Classification Instrument (ACCCI) identified seven activity domains for ambulatory care nursing: patient counseling, healthcare maintenance, patient education, primary care, therapeutic care, normative care, and non-client-centered care. Each of the domains contains categories of nursing activities with similar complexity. Verran believed that additional research on the categories would help classify activities based on complexity of nursing care and the categories would be helpful in the development of a tool to determine staffing. In 2005, the American Academy of Ambulatory Care Nursing published a complete annotated bibliography of nursing workload measurement and ambulatory care nurse staffing, with more than 100 articles identified. Some of the work was adapted from the inpatient classification systems, whereas other work clearly built on ACCCI.

Swan and Griffin (2005) measured nursing workload in ambulatory care and provided an overview of instruments for measuring nursing workload. A comprehensive summary of tools used to measure ambulatory nurse workload identified the need to have conceptually consistent, reliable, and valid measures to justify staffing needs in the ambulatory care setting and include patient characteristics, nursing role characteristics, and the number of patients requiring care in the ambulatory care setting (Swan & Griffin).

Cusack et al. (2004) documented the process of developing an acuity system for the radiation and oncology ambulatory care setting. The acuity system used the prototypical method to design a scale based on patient intensity. The patients were placed into five levels, ranging from port access and simple patient teaching at level 1 to complex chemotherapy and fever neutropenic workup at level 5. Each level had a time frame that varied from less than 30 minutes to more than 4 hours.

Chabot and Fox (2005) described the development of a patient classification system in an outpatient infusion center setting. The patient classification system was used to help nurses complete their jobs safely and more efficiently by using time management. Nursing time required for care of patients in the setting was essential to making an appropriate schedule. The patients were scheduled every 30 minutes, and each patient was matched with a specific nurse depending on nurses’ hours worked and the nursing care required; this allowed nurses to be relieved for lunches and to regularly finish on time.

A review of literature was essential in providing a framework for the development of a patient acuity tool for the ambulatory oncology setting. Using concepts and examples from other settings supported the work of designing a tool based on complexity of treatment for the ambulatory oncology setting.

**Identifying the Need for Change**

Prior to the development and implementation of the acuity tool, decisions regarding staffing of infusion rooms were based on the type of treatment and volume of patients as recommended by Ireland et al. (2004). One nurse from each clinic sent the following information for the next day to the two full-time nurse schedulers: number of patients scheduled for chemotherapy, injections, nonchemotherapy IVs, nurse assessments, ports, and total number of patients. The schedulers determined clinics’ staffing needs based on the information combined with staff requests such as vacations, family medical leave, and absence because of illness. Depending on the volume of patients, schedulers would assign the internal float pool where needed and reassign nurses to different clinics. For example, if one clinic had 7 patients, including 3 patients scheduled for chemotherapy, and 2 nurses assigned, whereas another clinic had 65 patients, with 28 patients scheduled for chemotherapy, a nurse from the clinic with only 7 patients would be reassigned to the clinic with 65 patients along with a float nurse. This way of staffing was not a true representation of the complexity of the treatment regimens, and, therefore, resources were not always optimally used.

Over time, nurses started to get frustrated with the process of determining staffing for patient care. The reasons for frustration were multifold. Nurses realized that the treatments were more complex with the addition of new targeted therapies and complicated treatment regimens that required closer monitoring. Nurses believed that with the increased patient complexity, additional staff was needed; they suggested that a better way to determine staffing would recognize the complexity of treatments. The dissatisfaction on the part of the nurses, in addition to the status quo and the desire to change, was the impetus that led to the identification of a better approach to nurse staffing.

**Tool Development**

In the fall of 2006, the administrative director of operations and a nurse practitioner recognized the nurses’ concerns and the need for the development of a staffing tool. The resulting tool was an adaptation of those identified in the literature review, taking into account the types of procedures performed in the infusion rooms. For example, activities such as packed red blood cell transfusions were deleted because the infusion rooms did not administer them, and specific chemotherapy treatment regimens administered in infusion rooms were added.

At this point in the process, developers recognized that a nurse familiar with the infusion room activities should assist in refinement of the tool. The prototypical method of classification of five levels with assigned time frames seemed to be best fit for the infusion rooms. A list of descriptors and a point value was assigned to each level. The tool was presented to the nurses for further evaluation and to solicit suggestions and further refinements were made.

**Tool Implementation**

In October 2006, the new acuity tool was presented to the infusion nurses and reviewed in detail, clearly defining the descriptors at each level. Nurses were told that each level had a point value and each patient on the daily schedule would be assigned a level. Implementation of the acuity tool would be done in two parts: evaluation and daily implementation. Evaluation would focus on data collection by using the tool to assess what happens on a daily basis in the infusion rooms. The total points would be added and divided by the number of nurses in the infusion room.
to calculate a total acuity. If the tool proved to be useful, the tool would be used to determine staffing on a daily basis.

Through discussion, the nurses decided that they could provide care to one level V patient, one level IV patient, one level III patient, two level II patients, and four level I patients; a total acuity level of 20 points per nurse per day (see Table 2). Each of the 11 clinics had at least one to two oncology certified nurses in the infusion room. Although the staffing workload was identified as ideal, because nurses probably do not care for a level five patient each day, variation was likely.

For the first phase, the project team reviewed the infusion room schedules on a daily basis and assigned a level to the patients on the schedule. If the reason why a patient was being seen in the infusion room was questionable, a call was made at the specific clinic for clarification. Because of the need to reassign nurses from clinic to clinic, the actual number of nurses in the infusion room for the day and the full-time equivalents were tracked to further evaluate staffing patterns. Data collection occurred during a two-month period at all 11 clinics.

Use of the acuity tool required that the infusion schedule indicate which treatment regimen the patient was receiving. The infusion nurses thought it would be important to instruct medical secretaries, medical assistants, and other nurses who scheduled patients about the importance of indicating the treatment the patient was to receive on the schedule. The instruction would help in collection of the data and would give a better representation of the infusion room activities.

During the data collection period, the project team and the nurses noted that the tool was time consuming and where activities should be placed was confusing. Some of the treatment regimens that patients were receiving were not reflected on the tool. As a result, the tool needed to be revised.

Revision of the Acuity Tool

The nurses agreed that the tool needed to be simple enough so that anyone who picked up an infusion schedule and looked at the tool could assign a level to a patient. Reviewing the activities of the infusion room revealed that the nurses not only administered chemotherapy but also performed nonchemotherapy-related activities such as nurse checks and blood draws from implanted ports. To represent the various tasks, the tool was divided into three categories. The first category corresponded to the level and amount of time required for that level. The second category represented nonchemotherapy-related activities, such as nurse checks and phlebotomy, and the third category identified chemotherapy and treatment regimens (see Table 3).

Important to the success of the revised tool was determining at which level each nonchemotherapy activity and chemotherapy regimen would be placed. The infusion room schedule, chemotherapy guidebook for nurses, and the organizations’ order sets were reviewed to ensure that all activities were reflected on the tool. After each activity was assigned an acuity level, an infusion nurse meeting was held to review the tool. The meeting helped revise the tool even further. The nurses added the new chemotherapy agents or regimens to the tool and changed the category or level of acuity of others. Based on their clinical experience, the nurses requested that nursing time allotted be increased under each level. The infusion nurses stressed that, because a patient’s regimen runs for a period of time, the patient may not require constant nursing intervention. Consensus was achieved by the infusion nurses to establish an estimated nursing care time that describes the minimum amount of time a nurse may spend with a patient. A level I would have an approximate nursing care time of 20 minutes, a level II patient would need approximately 45 minutes of nursing care time, level III 60 minutes, level IV 90 minutes, and level V 180 minutes. The time allotments took into account the premedications; the treatment regimen; and the amount of time needed to assess the patient, start an IV line, administer the treatment, and disconnect and discharge the patient.

Evaluation

Overall, the revised acuity tool proved to be valuable; it was used for another two months before being used on a daily basis. The tool was easy to use and reflected the treatments and activities in the infusion rooms. The evaluation of the project revealed the patterns and trends of the infusion room activities and provided insight into where the gaps in staffing existed. The data collected over the two months revealed three important findings in the infusion rooms.

First, actual staffing was not found to be an accurate representation of patient complexity when compared to proposed full-time equivalent staffing. The former staffing method of placing nurses based on number of chemotherapy treatments and volume of patients resulted in higher acuity levels per nurse than if the acuity tool had been used; indicating that the acuity tool based on complexity of patient treatments was needed. Second, the developers discovered that one clinic consistently had high acuities on Tuesdays and Wednesdays, which required additional staffing. A decision was made to hire an additional infusion nurse for Tuesdays and Wednesdays at the clinic. Third, an acuity level of 20 points per nurse was documented as appropriate to determine staffing and could be used as a guide to determine staffing on a daily basis.

Daily Implementation

Following the presentation of the results of the evaluation, nurses were delighted that the tool was found to be a good representation of the complexity of treatments in the infusion rooms. The revised acuity tool was implemented in May 2007 and has proven to be very useful in staffing the clinics to date. One nurse from each clinic assigns a level to the patients on the schedule two days in advance. The total acuity is collected and divided by the number of nurses working that day in the infusion room. When the total acuity per nurse rose above 20, an effort was made to send another nurse to assist in the infusion room.

Revised Table 2. Total Daily Nursing Acuity Per Day

<table>
<thead>
<tr>
<th>ACUITY LEVEL</th>
<th>NUMBER OF PATIENT MIX</th>
<th>ACUITY POINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>II</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>III</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>IV</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>V</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>

*Note. Total acuity = 20 points or any combination to reach 20*
An initial analysis using the tool on a daily basis revealed three findings. First, because of patient condition and nurse work style and speed, acuity of 20 was overwhelming for the nurses on some days and patients were waiting for long periods of time. The nurses would then call the scheduler for additional help from another clinic.

Second, the most difficult days to staff were after weekday holidays because the patients were shifted to the other days and staffing was limited because of vacations. The acuity per nurse tended to be greater than 20 during holiday weeks but still lower than 25 per nurse; these days were not optimal staffing conditions for the nurses but were manageable (see Figure 1).

Finally, after 16 weeks of using the acuity tool on a daily basis, the total acuity per nurse was examined for how many times the total acuity per nurse exceeded 20 and required additional staffing. Two of the clinics were determined to need additional staffing on a regular basis. One clinic exceeded the 20 per nurse routinely on Monday and Thursdays, which required

<table>
<thead>
<tr>
<th>LEVEL</th>
<th>NONCHEMOTHERAPY-RELATED ACTIVITIES</th>
<th>IV AND SUBCUTANEOUS CHEMOTHERAPY-RELATED TREATMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level I: less than 30 minutes</td>
<td>Laboratory tests, nurse assessment, IV access and/or removal, central line access, dressing change, coordination of care, arranging blood transfusions, laboratory-only port draw (performed by nurse), ambulatory infusion pump paperwork or discontinuing ambulatory pump</td>
<td>Darbepoetin-alpha, B12, enoxaparin, filgrastim, flu vaccine pneumovac, fulvestrant, goserelin, l-asparaginase, leuprolide, leuprolide, octreotide, oprelevkin, and pegfilgrastim</td>
</tr>
<tr>
<td>Nursing time: 20 minutes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level II: 30–90 minutes</td>
<td>Port, line troubleshooting; hydration with or without assessment; administration of IV medication, including pain, antibiotic, and antiemetics; phlebotomy</td>
<td>Subcutaneous cytarabine because of side-effect management Subcutaneous alemtuzumab because of side-effect management Subcutaneous interferon alfa-2b, recombinant for injection because of side-effect management Subcutaneous azacitidine because of side-effect management Second or subsequent infusion of 5-fluorouracil, albumin-bound paclitaxel, bevacizumab, bleomycin, bortezomib, cetuximab, cyclophosphamide, decitabine, oxaliplatin, epirubicin, etoposide, fludarabine, gemcitabine, topotecan, interferon alfa IV, interleukin, iron sucrose injection, methotrexate, vincristine, panitumumab, carboplatin, pemetrexed, sodium ferric gluconate, temsirolimus, trastuzumab, whin ro, vinblastine, or zoledronic acid</td>
</tr>
<tr>
<td>Nursing time: 45 minutes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level III: 1–2 hours</td>
<td>Patient and family education (cycle 1, day 1 chemotherapy)</td>
<td>Second or subsequent infusion of immunoglobulin IV, iron dextran, or pamidronate First infusion of bevacizumab, cetuximab, or trastuzumab Weekly paclitaxel and platinol VP-16 One to two chemotherapy drugs in one treatment Arsenic trioxide, carmustine, cladribine, dacarbazine, daunorubicin, doxorubicin, dexamethasone, doxorubicin, doxorubicin liposome, epirubicin hydrochloride, irinotecan, mechlorethamine, mitomycin, mitoxantrone, vonozolibine</td>
</tr>
<tr>
<td>Nursing time: 60 minutes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level IV: 2–4 hours</td>
<td>Three-hour paclitaxel Second or subsequent infusion of rituximab or platinol Three to four chemotherapy drugs in one treatment</td>
<td>Protocols ABVD—doxorubicin, bleomycin, vinblastine sulfate, and dacarbazine FOLFOX—5-fluorouracil, eloxatin, and leucovorin FOLFIRI—5-fluorouracil, leucovorin, and irinotecan BLP—bleomycin and platinol VP-16 RCHOP—rituximab, doxorubicin, cyclophosphamide, and vincristine PAC—paclitaxel, doxorubicin, and cyclophosphamide</td>
</tr>
<tr>
<td>Nursing time: 90 minutes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level V: more than 4 hours</td>
<td>Intraperitoneal chemotherapy First infusion of alemtuzumab IV, gemtuzumab, ibritumomab, ifosfamide or mesna, iron dextran, paclitaxel, rituximab, sodium ferric gluconate, or tiuxetan</td>
<td></td>
</tr>
</tbody>
</table>
additional staffing. In the other clinic, an additional full-time nurse needed to be hired because of the high acuities per nurse.

Daily data continually are being collected and analyzed. Also, based on the importance of patient outcomes and the relationship to staffing, the evaluation of patient outcomes, such as patient satisfaction with wait times and nursing care, are being assessed over a course of a year to strengthen the usefulness of the tool. Nursing satisfaction and retention also will be monitored closely.

Implications for Nursing

Establishing an acuity tool for the ambulatory outpatient setting to guide staffing can have a tremendous impact on the use of nursing resources. With challenges such as a nursing shortage, nurse competency, and patient condition and treatment, parameters to guide staffing must be defined to provide quality care while still meeting the demands and expectations of patients and of the clinical practice in delivering quality cancer care. Use of nurses’ suggestions and concerns as part of the acuity tool design resulted in an increased commitment to the execution and success of the project.

Although the tool developed contains many features that are unique to the specific ambulatory oncology setting, it provides an example and opportunity for other types of ambulatory practices to analyze and adapt it to ensure adequate staffing, nursing satisfaction and retention, and patient and physician satisfaction.

The author gratefully acknowledges the nurses and staff at Oncology Alliance and her family for their continued support throughout this project.

Author Contact: Julie DeLisle, RN, BSN, MSN, OCN®, can be reached at kdelisle@sbcglobal.net, with copy to editor at CJONEditor@ons.org.

References


