

Outpatient Oncology Acuity Based Staffing Model

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Background: Scheduling oncology patients for infusion therapy has been based on infusion chair time, physician's schedule, pharmacy capacity, and number of patients per RN. This has proven to be ineffective and inefficient. Scheduling strictly by chair time based on a set time for each specific drug or regime is inadequate to correctly predict the amount of time each nurse needs with each specific patient. The time allotted also needs to include the other activities associated with caring safely and competently, including using an electronic record, proper assessment time, education and explanation of treatments, side effects, and other issues that are concerning to the patient as well as time to prepare for each patient, lab assessment, physical and emotional assessment, history of illness and treatments. Time to clarify or speak with other members of the care team about patient needs. These are all responsibilities of the Oncology Nurse.

The infusion schedule depends on the physician. Frequently the patients arrive in infusion 15 minutes early to 45 minutes late depending on the time taken with the physician. The physician seeing the patient at one-time results in the patient being placed on the infusion schedule 30 minutes later, even when infusion does not have an opening at that time because it is the only opening the physician has. The physician visit affects the infusion schedule in other ways as well, such as cancelling their appointment because the patient is ill, or labs do not meet criteria. Adding patients to the infusion schedule same day because it was not communicated at the last visit that the patient also needed an infusion appointment or adding a treatment because it's convenient for the patient, regardless of nurse availability or chair availability. Physician practice differences such as lab preference, decision to treat and the treatment plan differences cause considerable confusion among nurses and pharmacy. The use of the EMR (electronic medical record) and physician order entry, has proven that without standard practice among the physicians, issues arise daily with orders to be completed, conflicting orders, and orders that are not actually orders. This confusion has caused medication errors as well as missed orders. Unfortunately, the patient is caught in the middle of all this confusion.

The pharmacy is also a part of scheduling for infusion. The pharmacy has only one hood to mix chemotherapy, and one hood to mix other non-chemotherapy drugs. This results in an inability to mix more than 2 chemotherapy drugs at a time.

The RN assignment is the last part of this very large, complicated puzzle. The charge nurse assigns nurses to patients by time and chair availability. Which nurse has an opening and a space at any given time. The treatment regime, patient condition, and any changes to plan were not accounted for.

All these factors created a very volatile schedule for infusion nurses, increasing job dissatisfaction, perceptions of unequal assignments, confusion, and sensory overload. This way of scheduling has proved unsuccessful despite several past efforts to adapt. We have attempted to schedule by resource, adjusting chair times and simplifying what the schedulers must go through to get a patient on the infusion schedule. The results are more nurses than patients, more patients than nurses, and a heightened sense of powerlessness and frustration for all staff involved. The Infusion Department is lacking in voice and power over our own schedule. Nurses are concerned for safety, concerned with the ability to care properly for patients in a timely fashion and concerned for their own practice. The American Nurses Association reports “evidence that higher staffing levels are associated with lower rates of patient death and harm (ANA 2017). Oncology nurses require time to provide the care that prevents patient death and harm.

Objectives: Review, adapt and create an acuity-based staffing model for Outpatient Oncology Infusion Services, that will translate to a schedule with less fluctuations and more stability using each resource and chair efficiently and effectively. The goals are to increase employee engagement, equity in workload distribution, job satisfaction, as well as the ability to provide competent, safe, complete care with the ever-increasing demands of treatment complexity, comorbid conditions and time.

Process: A complete historic review was done for a random period of 50 infusion days. Past schedules, nursing assignment, and chair times were reviewed. The frequency of time slots used and for what purpose was also reviewed. A thorough review of current literature regarding outpatient acuity from several sources such as the Oncology Nursing Society, Nursing Economics, and the American Nurses Association was completed. An acuity tool was created for our infusion unit using these resources. Below is an example of acuity levels and defines each level by nursing time.

| Level #, Nursing time required not chair time. % of time required for 1FTE | Non-chemotherapy Examples | Chemotherapy Examples |
|---|--|---|
| Level 1 -less than 30 minutes = 0.06% | Nurse assessment, IV access/removal, Port/PICC lab draws or flushes. Peripheral lab draw. EPO, B-12, Aranesp, Neupogen, Neulasta injections. | CADD pump removal. |
| Level 2 -31 to59 minutes =0.12% | Hydration without other IV medications, Reclast, Venofer (200mg or less), | Single agent infusions-Bendamustine, Gemzar, Etoposide, Herceptin, Perjeta, Opdivo, Avastin, Alimta, Carboplatin, |

| | | |
|--|---|---|
| | Port/PICC de-clotting, PICC line dressing changes. Octreotide, Lupron, Faslodex, Zoladex. | Cytoxan, Taxotere, Topotecan, Vincristine, Vidaza, Velcade, etc. |
| Level 3 -60 to 89 minutes=0.18% | Therapeutic Phlebotomy, 1-unit PRBC or PLTs, Taxol (weekly), Rituxan, Remicade. | Two drug therapies such as AC, CMF, 5FU/MTX, Herceptin/Perjeta, Carboplatin/Taxol, etc. |
| Level 4 -90 to 179 minutes = 0.24 | IVIG infusion. Therapeutic Phlebotomy (greater than 300cc) Venofer (greater than 200mg). 2 units PRBCs. | Any first-time chemotherapy, complex/multi-drug treatments such as FOLFOX, FOLFIRI, FOLFIRINOX, ABVD, CHOP (without Rituxan), DTIC, Taxol (3 hour), Taxol/Herceptin/Perjeta, etc. |
| Level 5 -greater than 180 minutes =0.38 to 0.63 | First IVIG, Hydration with multiple IV meds/frequent blood draws. Seriously ill patient-unstable, septic, neutropenic, intractable pain, nausea and vomiting. | First and second dose Rituxan or CHOP with Rituxan. Any patient experiencing a reaction to new therapy or having a history of prior reactions. |
| | ADD 1 point for any patient that is immobile or severely disabled. | ADD 1 point to every patient when no volunteer available to clean rooms, run labs, provide comfort such as food/drinks/blankets/pillows. |

The American Nurses Association 7 core components of nursing staffing (ANA 2015) Rule number 4 states “Staffing needs must be determined based on an analysis of healthcare consumer status (e.g., degree of stability, intensity, and acuity), and the environment in which the care is provided. Other considerations to be included are: professional characteristics, skill set, and the mix of staff and previous staffing patterns that have been shown to improve outcomes.” The patients in the review were separated into acuity level and then determined the percentage of nursing time for each level (Tuna et al, 2015). Each RN is counted as 1 FTE for 8 hours a day. Each level of acuity was given a percentage of that RN’s 1 FTE. For example, a blood draw takes 0.06 percent of an 8-hour day. 1 RN FTE could care for 16 level 1 patients in an 8-hour day resulting in 0.96% of 1 FTE taken in patient care. Another Example: 2 level 5 patients is a .76%, a level 4 is .18% totaling .94% of 1 FTE. Together both acuity and time are counted and the recommended acuity per nurse per day is an acuity of 14 to 16 in any combination of levels to equal 1 FTE per 8-hour day. Literature review did not address the length of shift for each resource, the recommended acuity levels of 16 to 20 were for unknown shift duration. Possible 8, 10, or 12 hour shifts.

A 2-week (11 infusion days) trial of charge nurse assigning patients by acuity level was completed with full nursing support. The trial also addressed perceived acuity discrepancies by nursing as the discrepancies arose. Each case was discussed and reviewed by all staff participating with the results of acuity level assigned being changed as required.

Investigation continues to the separation of infusion scheduling with physician scheduling. Recommend separating to help stabilize the infusion schedule, and decrease the frustration as well as the confusion of early/late/cancelled patients.

Findings: Infusion was staffed with an average of 4.6 nurses daily or 4.6 FTEs. The average daily scheduled census was 35.9 patients, the actual daily census was 32.9 patients per day. Each RN or FTE cared for an average of 7.2 patients daily with an average acuity of 12.7 each. This information was also broken down by resource and individual nurses were allowed to review their personal statistics as compared to each other. Each resource was identified by a number only and each RN had knowledge of their specific number. Included in totals are an average of 4.1 cancels daily (approximately 11% of our daily schedule) and 1.2 additions (3%). Average daily acuity total scheduled was 64.9 with actual being 58.7. Following is average number of patients scheduled daily with a specific acuity level and conversion of % of time required for each level:

| | |
|--|--------------------------------------|
| Level 1 18.5 patients per day (52%) | at 0.06 % each for 1 FTE = 1.11 FTEs |
| Level 2 9.4 patients per day (26%) | at 0.12% each for 1 FTE =1.12 FTEs |
| Level 3 4.7 patients per day (13%) | at 0.18% each for 1 FTE = 0.8 FTE |
| Level 4 3 patients per day (8%) | at 0.38% each for 1 FTE =1.14 FTEs |
| Level 5 0.3 patients per day (<1%) | at 0.63 % each for 1 FTE = .18 FTE |

These results require an average of **4.4 FTEs** to care for scheduled patients. Please see results of history review for data collected.

The infusion center began a trial of assigned acuity assignments. Staff also documented time taken for each PF/Lab draw/ and PICC care to document needed time for these procedures. Please see current data collected. This trial was well supported by staff members and upon completion, staff wished to continue assignments by acuity. They felt that assignments were more equally distributed and the knowledge of having an actual goal to meet daily helped with

anxiety and frustration levels. Staff were very engaged in the process and supportive of conclusions drawn.

Results of real time data:

Level 1 16.3 patients per day (53%) at 0.06% each = 0.98 FTE

Level 2 7.9 patients per day (26%) at 0.12 % each = 0.948 FTE

Level 3 4.3 patients per day (14%) at .18% each = 0.77 FTE

Level 4 2.3 patients per day (7%) at .38% each =0.87 FTE

Level 5 0.09 patients per day (<1%) at 0.63% each =0.06 FTE

These results required an average of 3.62 FTE for an average day. We were staffed with an average of 3.9 FTE during the trial period.

Conclusions: There is limited information and research in safe staffing of outpatient oncology units. A lion's share of research and recommendations have been made toward in-patient, hospital-based staffing, however, as the economics of healthcare progress, more and more treatments are being done on an outpatient basis. The outpatient oncology unit is seeing more complex treatments, increased length of stay, more comorbidities, and increasing age in the patient population served. The process of assigning acuity level to each patient to determine safe staffing levels is an efficient and effective way to determine daily staffing needs as well as providing Registered Nurses with the confidence that they will be allowed to participate in our organizational mission of Providing Excellence in Healthcare.

The first steps have been taken and shown to be of value, providing accurate comparison to national benchmarks, to our organizational mission, our unit and nursing. The work must continue to adapt scheduling functions to allow the use of this tool.

Recommendations: My first recommendation would be to sever the physician schedule with infusion scheduling. Patients currently visit infusion on two days, first day for labs and second day for provider appointment and infusion, if we began to schedule first day for labs and provider, then make day two just the infusion day, more stability could be gained. The day before infusion appointment, after lab/provider appointment, communication of changes and cancels could be dealt with prior to staffing for the next day.

Keep one or two level 1 appointments free daily for the addition of same day patients as needed.

Work closely with pharmacy and scheduling to create a template that takes acuity, chair time, and pharmacy limitations into account as well as resources that are available. The goal being a stable schedule for infusion that includes the nursing time needed for each, individual patient.

Continue to assign nurses to a set acuity of 14 to 16 for an 8-hour shift. This has proven to be an efficient and effective way to provide safe, cost efficient, competent care to our clients.

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Results of History Review

I looked at a total of 50 days, classified each scheduled patient into levels 1 to 5.

Levels defined:

Level 1 – Nursing time less than 30 minutes. Simple injections such as B-12, Aranesp, EPO, Neupogen, Neulasta, Firmagon, Lovenox, Lupron, Prolia, and Xgeva. Port flush, Port access, Port lab draw, Cadd pump removal, and Peripheral blood draw.

Level 2- Nursing time of 45 minutes. Hydration (no IV meds), Reclast, Zometa, Venofer (200mg or less), Port de-clot, Octreotide, Faslodex, and Zoladex. Single, simple infusions – Bendamustine, Gemzar, Etoposide, Herceptin, Perjeta, Opdivo, Avastin, Alimta, Carboplatin, Cytoxan, Taxotere, Topotecan, Vincristine, Vidaza, and Velcade.

Level 3 – Nursing time of 60 minutes. Therapeutic phlebotomy, 1 unit of PRBC/PLTs, Taxol (weekly), Rituxan, Remicade, and IVIG. Includes 2 drug therapies such as AC, CMF, or 5FU/MTX.

Level 4 – Nursing time of 90 minutes. Any first time chemotherapy, complex, multi drug treatments such as Folfox, Folfirinox, ABVD, Chop (without Rituxan), DTIC, Taxol (3 hour), and 2 units PRBCs.

Level 5 – Nursing time of 180 minutes. First Rituxan, RCHOP, first IVIG, IVF with multiple IV meds. Seriously ill patient – unstable, septic, neutropenic, intractable pain, nausea and vomiting, multiple blood draws.

Add 1 point for any patient that is immobile or severely disabled.

Results

Average patients scheduled per day: 35.9

Average patients cancelled per day: 4.1 (4%)

Average scheduled patients per day by acuity level:

Level 1 -18.5 ppd (51%)

Level 2- 9.4 ppd (26%)

Level 3 – 4.7ppd (14%)

Level 4- 3ppd (8%)

Level 5 -0.32ppd (1%)

Average acuity per nurse per day: 14

Average patient load per nurse per day: 7.1

Established ratio of 1 RN to 6 – 8 patients per day.

Recommended acuity per nurse per day:

DeLisle (2004): 20

Vorthems (2015): 16 to 20

Edwards (2017): <20

Tuna (2015): 16

Current Data Collected

| Date | 10-Jan | 11-Jan | 12-Jan | 15-Jan | 16-Jan | 17-Jan | 18-Jan | 19-Jan | 22-Jan | 23-Jan | 24-Jan | |
|---------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|----------|
| # RNs | 4 | 4.5 | 4 | 4 | 3 | 4 | 4.5 | 4 | 3 | 3.5 | 4 | 3.863636 |
| Level 1 | 15 | 18 | 12 | 14 | 13 | 25 | 14 | 16 | 20 | 16 | 16 | 16.27273 |
| Level 2 | 8 | 11 | 15 | 7 | 5 | 8 | 6 | 6 | 5 | 7 | 9 | 7.909091 |
| Level 3 | 8 | 3 | 7 | 0 | 2 | 2 | 7 | 7 | 3 | 4 | 4 | 4.272727 |
| Level 4 | 1 | 5 | 2 | 2 | 2 | 2 | 5 | 0 | 0 | 1 | 5 | 2.272727 |
| Level 5 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.090909 |
| Total Accuity | 59 | 69 | 71 | 36 | 42 | 55 | 67 | 49 | 39 | 46 | 66 | 54.45455 |
| Per RN | 14.75 | 13.8 | 17.8 | 9 | 14 | 13.8 | 14.9 | 12.3 | 13 | 13.1 | 16.5 | 13.90455 |

| | | | | | | | | | | | | |
|----------------|------|------|------|----|------|------|------|------|------|------|------|----------|
| Total Patients | 32 | 37 | 36 | 23 | 23 | 37 | 32 | 29 | 28 | 28 | 34 | 30.81818 |
| CX | 5 | 6 | 2 | 2 | 4 | 4 | 5 | 0 | 2 | 0 | 3 | 4 |
| Level 1 | 14 | 15 | 11 | 13 | 13 | 22 | 13 | 15 | 19 | 17 | 15 | 15.18182 |
| Level 2 | 4 | 9 | 15 | 6 | 3 | 6 | 4 | 8 | 4 | 6 | 7 | 6.545455 |
| Level 3 | 8 | 4 | 5 | 3 | 3 | 4 | 6 | 6 | 3 | 3 | 6 | 4.636364 |
| Level 4 | 3 | 4 | 2 | 0 | 1 | 2 | 4 | 0 | 1 | 3 | 2 | 2 |
| Level 5 | 0 | 0 | 5 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 0.909091 |
| Total Accuity | 58 | 61 | 69 | 44 | 32 | 54 | 60 | 49 | 40 | 50 | 65 | 52.90909 |
| Per RN | 14.5 | 13.6 | 17.3 | 11 | 10.7 | 13.5 | 13.4 | 12.3 | 13.3 | 14.3 | 16.3 | 13.65455 |
| Added | 1 | 1 | 0 | 2 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0.909091 |
| Total Patients | 28 | 30 | 34 | 23 | 20 | 34 | 28 | 29 | 27 | 29 | 32 | 28.54545 |

Average Duration of Lab/PF =19.5 minutes

Average Duration of PICC care/Lab = 31.8 minutes.

0730 time slot used 34% of 11 month period.

1700 time slot used 3% of 11 month period.