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Implementing Patient Acuity Scale on a Medical-Surgical Unit

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Abstract

Problem: Nurses commonly report dissatisfaction with their workload levels due to inequity of shift assignments. Imbalanced workload distribution has been shown to lead to missing or delayed care. Increased nursing workload has been linked to increased fall rates, healthcare associated infections, and avoidable deaths. Research has shown that patient classification is more accurate when an instrument is used. The purpose of this quality improvement project was to implement a patient acuity tool to aid nurse-patient shift assignments on a medical-surgical unit. The project aimed to provide a standardized and objective method of measuring patient acuity.

Methods: The project took place on a 30-bed medical-surgical unit of a Midwest suburban hospital employing 26 registered nurses. Nurses were asked to complete a pre-intervention survey regarding nurse perception on workload distribution. During the eight week intervention period, nurses on the unit were asked to complete an acuity tool for each patient assigned to their care. According to the tool, each patient was assigned an acuity level 1-4. Charge nurses utilized patient acuity levels to balance workload in nurse-patient assignments for the oncoming shift. After the intervention period, nurses were asked to complete a survey assessing perception of workload distribution as well as satisfaction with acuity tool implementation.

Results: Acuity tools were completed for every patient on the unit on 43% of shifts while no tools were completed on 42% of shifts. The average patient acuity on shifts with complete acuity information was 2.08. The average difference in nursing workload score range was 2.17. Significant increases were found in nursing perception of fair and even

workload distribution (p=0.023) as well as the RN's assessment of patient acuity being reflected in patient assignments (p=0.001). Nurses on the study unit found the acuity tool easy to use and effective at evenly distributing patient acuity.

Implications for Practice: This project along with existing research indicates that the use of an objective acuity tool assists in distributing workload evenly with regards to nurse-patient assignments. Steps need to be made to increase compliance in order to experience the full benefits of acuity tool use. Increased education, surveillance, and leadership involvement could be beneficial to increase compliance.

Implementing Patient Acuity Scale on a Medical-Surgical Unit

The demanding and constantly evolving field of nursing presents new challenges to bedside nurses every day. Nurses commonly report dissatisfaction with their workload levels due to inequity of patient assignments (Al-Dweik & Ahmad, 2019). In a study by Sir et al. (2015), workload is defined as "a measure of the relationship of the amount of resources demanded by a task situation… to the amount of resources a person has available to complete the task…". According to Meyer, Fraser, & Emeny et al. (2020), intensity of nursing care or workload varies based on patient-related tasks, patient abilities, and psychosocial status among other factors. Although California is the only state with mandated staffing ratios, even this mandate is disparaged by experts due to failure to account for patient acuity levels resulting in imbalanced nurse workload (Sir et al., 2015).

Although there is ample research on hospital staffing models to reduce cost, improve patient outcomes, and increase co-worker satisfaction, these models do not aid unit leaders in workload distribution among nurses. Many hospitals staff the number of nurses according to the current and projected number of occupied beds for each shift (Ayan & Turkmen, 2019). This method can be insensitive to the individual needs of the patients and skill levels of nurses for decision making in patient assignments. Nurse scheduling and budgeting to reduce cost, improve working environment, and improve patient outcomes are common foci of hospital administration, but nurse-patient assignment has not been properly studied in the operations research literature (Sir et al., 2015). This indicates the necessity of "nurse-patient assignment models" as tools to support daily decision making on units with constantly changing census and patient

acuity. Measurement of patient acuity can allow for staffing adjustments to achieve a balance between workload and available nursing staff as well as discharge planning and patient distribution across units (Perroca, 2011). A survey showed that 83% of participating nurses agree that improving environment and workload can improve nurse retention (Sir et al., 2015).

Inconsistent workload distribution that is made arbitrarily can also have negative effects on patient outcomes (DiClemente, 2018). A survey of nurses in five different countries revealed that increased workload resulted in basic nursing interventions not being completed (Duffield et al., 2011). A study by Carlesi et al. (2017) found a positive correlation between increased nursing workload and patient fall rate. Using a new metric of workload by dividing the PRN-80 workload measure by nurse workload hours to measure nursing demand/supply, another study found that negative outcomes for patients, nurses, and hospitals increased when the nursing demand/supply exceeded 80% (Duffield et al., 2011). A prospective cohort study by Daud-Gallotti et al. (2012) identified increased nursing workload as the main risk factor for healthcare associated infections in ICU and stepdown units. Research has shown direct links between staffing ratios and nursing workload and avoidable deaths (Meyer, Fraser, & Emeny, 2020). Relationships between staffing mix, nurse-patient ratios, skill levels, and patient acuity have been linked to patient complications, length of stay, and mortality (Carter & Burnette, 2011). Hegney et al. (2019) argues that nursing workload and staffing ratios can lead to care rationing, or missed or delayed care tasks due to decreased resources or capacity.

Previous research has determined that patient classification is more accurate when an instrument is used compared to without an instrument (Ayan & Turkmen, 2019).

Patient acuity tools have been linked to increased satisfaction, safety, and quality of care (Al-Dweik & Ahmad, 2020). "A standardized tool allows nurses not only to communicate patient needs, but also communicate their own needs" (DiClemente, 2018, p. 387).

The setting of this project is a 30-bed medical-surgical unit of a Midwestern suburban hospital. The turnover on this unit in the last year has been approximately 21%. The unit is budgeted for 32.55 FTEs with only 23.55 filled. One reported reason for the turnover on this unit, as well as a complaint frequently voiced by current staff, is dissatisfaction with workload balance regarding patient acuity.

The purpose of the project was to implement a patient acuity tool on a medical-surgical unit to aid nurse-patient shift assignments. The intended outcome of implementation was to distribute nursing workload in an objective and equitable manner. Achieving these objectives have the potential to increase nursing job satisfaction, reduce staff turnover, and improve patient outcomes.

Review of the Literature

Literature review was completed utilizing the databases CINAHL, Medline, and PubMed. The initial CINAHL searches were performed utilizing a combination of the keywords "acuity tool", "medical surgical or med surg or med-surg" and "nurse satisfaction or job satisfaction". Inclusion criteria included English language, published since 2010, studies in an inpatient setting and article availability in full text online or through interlibrary loan. Exclusion criteria included pediatric, critical care, or outpatient setting. The initial search yielded only two articles, and the keyword "medical surgical" was eliminated to expand the search and include relevant articles involving other

specialties. Nine articles were retrieved with this search. The search term "nursing workload" was then added, yielding 14 results. The resulting articles were then assessed for relevance to the research topic and five articles were chosen for review. Subsequent searched in both CINAHL and Medline were completed with search terms "patient classification" and "nursing workload" and utilizing the same date and language parameters. These searches yielded 61 and 25 results, respectively. Four new relevant articles were chosen after title and abstract review. A PubMed search was also performed using terms "patient acuity tool" and "nursing workload" from which one pertinent article was selected. A total of ten articles met the criteria and were chosen for review (Appendix A).

As previously discussed, the articles highlighted the increasing and often imbalanced nursing workload and emphasized the need for an objective tool to distribute patient assignments evenly. Hegney et al. (2019) found that nurses reported poor workload regulation affecting care delivery across all sectors surveyed. A study that was specific to medical-surgical nursing highlights the increasing complexity of cases that are being admitted to these units, especially as an increasing number of surgical patients are now being discharged from outpatient surgery services (Chiulli et al., 2014). Patient assignments are often made out of convenience, considering factors such as room proximity and continuity of care from shift to shift (Meyer et al., 2020). These assignments are frequently made under time-pressure with limited information on the patients being assigned (Chiulli et al., 2014). Without a standardized acuity tool in place, many nursing units make patient assignments subjectively, which can result in workloads varying widely among nurses and shifts (DiClemente, 2018). Lack of an objective tool

can leave nursing staff to view the assignment process as arbitrary and unfair even if leadership staff is making an effort to distribute work evenly.

The articles that were reviewed utilized several different acuity tools with some being created specifically for the study population and some implementing existing tools. Ayan & Turkmen (2019) utilized a transculturally adapted version of Perroca's Patient Classification Instrument (PCI). Perroca's PCI was also utilized in the study by Al-Dweik & Ahmad (2020). The authors attributed their choice of Perroca's tool to its comprehensiveness as well as inclusion of relevant medical-surgical nursing indicators. Perroca's PCI uses nine categories, in which each patient is assigned a score 1-4 (Ayan & Turkmen, 2019). The care areas used to express nurse-patient dependency included investigation and monitoring, personal hygiene and elimination, skin integrity, locomotion or activity, nutrition and hydration, therapeutics, emotional support, health education, and care process planning and coordination. It was found that the transcultural adaptation of Perroca's PCI is an appropriate instrument to measure patient acuity in the hospital setting through adequate content validity index, exploratory and confirmatory factor analysis values, Cronbach alpha, and inter-rater reliability values (Ayan & Turkmen, 2019). Meyer et al. (2020) utilized an EHR-based tool to assign each patient a workload score which was updated four times daily. The automated tool considers assessments, medications, orders, activities of daily living, lines/drains/airways, risks, wounds, and admission/transfer/discharge. Firestone-Howard et al. (2017) chose the Harper and McCully Patient Acuity Tool for its inclusion of social and intellectual variables as well as medical needs. The tool considers complicated procedures, education, psychosocial factors, complicated IVs, as well as number and type of medications.

Chiulli et al. (2014) created a tool specific to their medical-surgical inpatient population that was inspired by other tools found via literature review was well as staff input. The tool classified patients using ten categories, divided into "clinical severity indicators" and "nurse workload indicators". Clinical severity indicator categories included assessment, respiratory, cardiac, medications/therapeutic protocols, drainage devices, and pain management. Categories under the nurse workload section included admit/discharge/transfer, education/psychosocial, wound/ostomy/continence, and ADLs/isolation. Carter & Burnette (2011) utilized the Synergy Model on a medical-surgical-pediatrics unit which included the Patient Score Guidelines Tool as the acuity component of the model. This tool assigned each patient a score 1-3 under three categories: stability, predictability, and complexity. Patient acuity as well as nursing skill was considered when making shift assignments. Although the study by DiClemente (2018) did not include a copy of the acuity tool used, the author discussed that the tool was created and modified specifically for the project with the input of stakeholders including nursing staff. Validity of the tool was assessed by providing nurses with sample patient scenarios to complete the acuity tool.

The articles focused on various outcome measures including perceived nurse workload satisfaction and different patient outcome measures. Nurse satisfaction was measured in several different ways throughout the articles. DiClemente (2018) measured nurse satisfaction through pre- and post-intervention surveys. Questions in the survey assessed knowledge of the current acuity model as well as questions regarding nurses' perception of workload fairness and whether they are able to provide effective patient care with the time and workload they are given. Hegney et al. (2019) analyzed the seven

questions regarding nursing workload from a larger survey previously completed. Al-Dweik & Ahmad (2020) utilized focus groups to assess nurses' perception of acuity tool implementation. A combination of focus groups during implementation and a post-implementation survey was used by Firestone-Howard et al. (2017). Chiulli et al. (2014) measured acuity tool effectiveness by comparison of the percentage of patients placed in each acuity category using the tool and using the traditional subjective method. While several studies discussed the potential for acuity tools and even workload distribution to have positive effects on patient care and outcomes, Carter & Burnette (2011) were the only ones to include a wide array of outcome measures including nursing, patient, and physician satisfaction, patient outcomes, and core measure benchmarks.

Most of the articles resulted in a clear and measurable benefit to acuity scale implementation, however others had varying results. Firestone-Howard et al. (2017) found a 20.84% increase in nurse satisfaction with the acuity of their assignment. The study by DiClemente (2018) revealed increased positive answers to survey questions related to job satisfaction and perceived quality of care provided after intervention. In particular, when asked about job satisfaction with regard to daily workload, the amount of participants that responded "satisfied" increased from 48% to 67%. Al-Dweik & Ahmad (2019) found a significant increase in nurses' satisfaction regarding both workload and standard of care after tool implementation. Survey questions regarding standard of care indicated that nurses believed that they were able to provide better care to their patients after tool implementation and were more likely to answer that patients on the unit are receiving the care they need. Chiulli et al. (2014) found that more patients were categorized into high acuity levels utilizing the tool compared to traditional

subjective assignment by charge nurses, suggesting that the traditional method failed to identify many high acuity patients. Al-Dweik & Ahmad (2020) found that both nursing staff and administration were satisfied with the tool's accuracy and ease of use. Some study participants even suggested the use of Perroca's tool be written into hospital policy. After Synergy Model implementation and use of patient acuity and staff skill mix to create nurse-patient assignments, staff nurses reported an 11% increase in overall engagement (Carter & Burnette, 2011). Nurse satisfaction with the facility was unchanged after implementation, but was in the 97th percentile prior to the project. Implementation of the Synergy Model and acuity tool also improved patient outcomes as evidenced by decreased length of stay, increased patient satisfaction, and decrease in both falls and severity of injury from falls.

The review of literature suggests benefits of acuity tool implementation to distribute nursing workload. Nursing satisfaction regarding perceived workload improves with an objective tool to measure patient acuity and make patient assignments. Equitable workload distribution can improve nursing care and facilitate teamwork. Long term benefits from a balanced nursing workload and increased satisfaction may include increased staff retention and less nursing turnover. As seen in some of the studies, acuity tool implementation also provides potential challenges. One major challenge is buy-in and compliance from nursing staff. Resistance to change is a challenge that must be properly addressed in the very early stages of the implementation process. While the ease of leveraging existing documentation through an EHR-based acuity tool can be a potential strength, this may not accurately capture patient workload if documentation is not comprehensive and completed in real time (Meyer et al., 2020).

This literature review identified a number of strengths and weaknesses in using acuity tools to assist with workload assignments. Stakeholder engagement was found to improve development and use of tools. DiClemente (2018) took great care to include nursing staff in the development and implementation process by allowing them to participate in development of the tool as well as providing extensive education in the form of meetings and in-services as well as providing sample scenarios to help staff become familiar with how to use the tool. Chiulli et al. (2014) also involved staff members in the process of creating and implementing their acuity tool. Including hospital administrators in focus group sessions increases the likelihood that acuity tool implementation will be expanded beyond the initial study unit (Al-Dweik & Ahmad, 2020). A potential weakness for the studies may include inaccurate completion of the acuity tools. DiClemente (2018) attempted to ensure accurate use of the tool by randomly selecting 15 tools every two weeks to assess for accuracy and compliance. Many of the studies failed to take measures in ensuring tools were filled out accurately. Low response rate is also a weakness of some of the studies. For example, the study by DiClemente (2018) yielded only a 64% pre-survey response rate. Resistance from nursing staff is a common weakness among most of the articles. In the study by DiClemente (2018), some staff members refused to complete the tool at all. Another weakness among the articles is failure to observe outcome measures outside of nursing satisfaction with workload. Many articles made note that evenly distributed workload had the potential to improve patient outcomes but did not include any outcome measures related to this in their study.

Recommendations for future projects include longer implementation time, strategies to improve staff participation, and a computerized program to keep track of

acuity scores (DiClemente, 2018). Hegney et al. (2019) recommends that patient acuity as well as staff skill-mix should be considered when assembling staffing plans. They suggest that management speak out about nursing workloads with assertion, include staff members in decision making, and develop a "systematic and forward planning approach". Further research on the measurement of nursing workload and patient acuity and the effect on both nurse and patient outcomes is needed to draw firm conclusions and recommendations for different hospitals and patient populations (Ayan & Turkmen, 2019).

Overall, the literature points to positive outcomes associated with acuity tool implementation in various nursing care settings. The wide array of available tools combined with many of the studies creating new tools specific to the target population does not provide significant guidance to which, if any, tool is superior to another. Only one of the articles assessed both nurse satisfaction and patient outcomes as outcome measures for tool implementation. Further research on the effects of acuity tool implementation would be beneficial.

The evidence-based framework used for the proposed project was the Plan Do Study Act (PDSA) Model. The PDSA cycle is used to test change on a small scale and involves four steps (IHI, 2021). The cycle involves developing a plan to test the change, carrying out that plan, observing the outcomes, and making appropriate modifications to improve on the change in the next cycle. The "plan" phase of this project involved review of the literature, stakeholder engagement, and staff education on acuity tool use. The "do" phase included acuity tool implementation over the study period. The "study" portion of the cycle included data collection and analysis including acuity tool compliance and

changes in nurse perception of workload. Dissemination of findings from the proposed project is the "act" phase which may lead to modifications in tool implementation or expansion to other units in the hospital.

Method

Design

This is a quality improvement project using a cross-sectional observational descriptive design. Data was collected through completed patient acuity tools, daily assignments, and pre and post staff intervention surveys. Data collected included the number of acuity tools completed each shift, unit census each shift, and survey assessing nurse perception on workload distribution.

Setting

This project took place on a 30-bed medical-surgical unit of a Midwestern suburban hospital. The hospital contains 767 beds and employs 2,847 co-workers. The study unit employs 26 registered nurses including 4 charge nurses.

Sample

Data was collected from a convenience sample of registered nurses employed on the study unit. Recruitment strategies included discussion of study and invitation to participate during daily shift change huddles as well as emails to the staff members' organizational email address. Inclusion criteria for participation in the pre/post intervention surveys on workload perception included employment on the study unit and participants must work at least one shift within the eight-week intervention period as well as one shift in the eight weeks prior to intervention. Exclusion criteria included float pool and agency staff not specifically contracted to the study unit as well as registered nurses

not working at least one shift during the intervention period (e.g., PRN staff not scheduled within study period, staff members on FMLA, etc.). The four charge nurses employed by the study unit were included in an educational session on how to use completed acuity tools to create patient assignments. All registered nurses working on the study unit during the intervention period were asked to complete an acuity tool for each patient to whom they are assigned.

Approval Process

The proposed study was approved by the organizational IRB through the QI determination process. The project was also reviewed by the UMSL IRB and determined to be a quality improvement project not requiring IRB review.

Data collection/Analysis

Data collection regarding acuity tool compliance included comparison of the number of acuity tools completed to the unit census for each shift in the form of a percentage. The data tracking tool used can be found in appendix B and includes unit census, number and type of staff RN, whether charge RN had a patient assignment, and number of acuity tools completed. The tool also included the number of patients under each acuity level and the range of workload scores for each shift. The acuity tool can be viewed in appendix C. The tool was adapted from Chiulli et al. (2014) and changes were made by the project director (PD) with staff RN input and consideration of patient population on study unit. The tool considers clinical severity indicators in the categories of "assessment", "respiratory", "cardiac", "medications and therapeutic protocols", "drainage devices and pain management". Nurse workload indicator categories include "admission, discharge and transfer", "education and psychosocial", "wound, ostomy, and

continence", "ADLs and isolation", and "safety". Each category or row includes examples for each acuity column. Patient acuity is divided into four levels from stable patient to high-risk patient. A workload score was calculated for each nurse by adding together the acuity level of each of their assigned patients. The range of workload scores was recorded by the investigator in the data tracking tool.

Data was also collected through pre and post-intervention surveys completed by staff nurses. The surveys, modified from Firestone-Howard et al. (2017), included questions using a 5-point Likert Scale and were distributed via institutional email. Along with demographic questions, the pre and post- survey included five questions regarding nurse perception of workload distribution and consideration of patient acuity when making assignments. The post- intervention survey included four additional questions regarding satisfaction with the acuity tool, ease of use, and willingness to continue using tool. See appendices D and E for survey questions.

Descriptive statistics were used to describe the sample and completion of the acuity tools. Data analysis for differences in the aggregate responses for the pre and post-intervention surveys was performed using inferential statistics via t-test. Data analysis calculations were completed with Intellectus Statistics (2019).

Procedures

Project implementation began with steps to inform and engage nursing staff in project participation. The project was introduced at the monthly staff meeting preceding implementation. Copies of the acuity tool were distributed and explained by the PD. Sample patient scenarios were provided for practice using the tool and all questions were answered. Handouts, copies of the tool, and sample patient scenarios were also made

available on the unit huddle board. Shift change huddles included reminders regarding project status and timeline.

Charge nurses were oriented on how to use completed tools to make nursing assignments. Charge nurses were instructed to evenly distribute highest acuity patients first and fill in lower acuity patients accordingly. They then checked for even workload distribution by calculating the workload score for each nurse and made changes if disparities were observed. Workload score was calculated by adding the acuity level (1-4) of each patient assigned to that nurse. Charge nurses were permitted to make exceptions for a workload disparity due to continuity of care only if the returning nurse requested to keep their higher acuity patients. An outline of education provided to charge nurses can be found in appendix F.

Following education of staff on the new acuity tool and the charge nurses in how to use the acuity tools in making assignments, the pre-intervention survey was distributed to all eligible nursing staff via Qualtircs to their institutional email. The survey was available for two weeks prior to tool implementation. Surveys included demographic data including employment status, where full-time is considered 36 hours per week, part-time is 24 hours per week, and PRN status is one required shift every 90 days.

Implementation of the acuity tool occurred for a trial period of eight weeks. Staff nurses were asked to complete a tool for each of their patients during their shift. Each tool included patient initials, room number, and shift. Upon completion, each patient was assigned an acuity level based on the tool. Nurses were asked to turn completed tools in to the charge nurse by 1700 and 0500 for day and night shift, respectively. The charge nurse utilized patient acuity levels to create nurse-patient assignments for the oncoming

shift. Completed acuity tools with patient initials redacted, copy of unit census, and shift assignments were collected by the charge nurse each shift and stored in a locked cabinet on the unit for data collection by the investigator. Unit census for each shift was printed at 1700 and 0500 to match when completed acuity tools were collected. Oncoming shift assignments were written on printed unit census.

The day after the eight week implementation period, a post-intervention survey was emailed via Qualtrics to those eligible to complete. The survey was made available for two weeks.

Results

The implementation period included 112 shifts over eight weeks. Acuity tools were completed for every patient for 43% of shifts and no acuity tools were completed for 42% of shifts. See Figure 1 for acuity tool compliance.

Figure 1

Tool Compliance
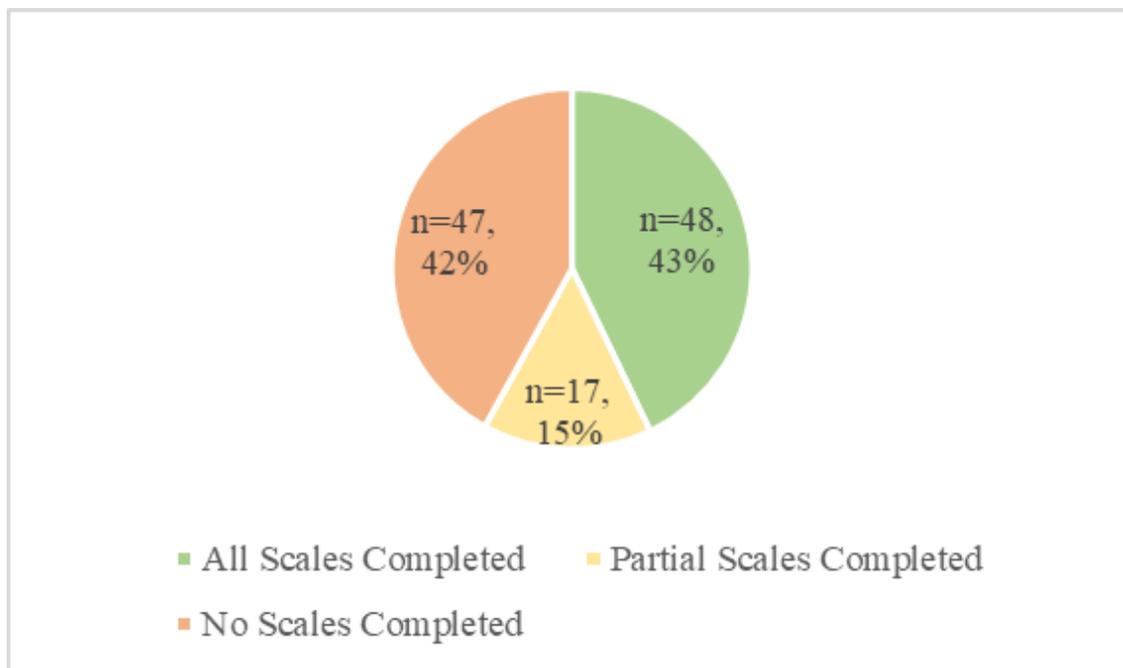
Tools were completed for every patient most often on the night shift (56.25%). Shifts where no tools were completed was most frequently observed for the day shift (63.83%). Partial tool completion occurred more frequently by the night shift nurses (70.59%). See Table 1 for tool compliance by shift.

Table 1

Tool Compliance by Shift

	All Tools Complete		Partial Tools Complete		No Tools Complete	
	n	%	*n*	%	*n*	%
Night Shift	27	56.25	12	70.59	17	36.17
Day Shift	21	43.75	5	29.41	30	63.83

Tools completed for every patient occurred most frequently on Fridays (20.83%). Days where no tools were completed occurred most frequently on Sundays (19.1%). See Table 2 for tool completion by day of the week.

Table 2

Tool Compliance by Day

	All Tools Complete		Partial Tools Complete		No Tools Complete	
	n	%	*n*	%	*n*	%
Sunday	5	10.42	2	11.76	9	19.15
Monday	8	16.67	2	11.76	6	12.77
Tuesday	8	16.67	1	5.88	7	14.89
Wednesday	4	8.33	5	29.41	7	14.89
Thursday	6	12.5	4	23.53	6	12.77
Friday	10	20.83	1	5.88	5	10.64
Saturday	7	14.58	2	11.76	7	14.89

On the 48 shifts where tools were completed for every patient, the unit census ranged from 20-31, with an average of 28.46. Total unit acuity was calculated by adding up the individual patient acuity for a shift. The total unit acuity ranged from 46-74 with an average of 58.94. The average individual patient acuity was 2.08. The number of patients in each acuity category was captured for shifts where all acuity tools were completed. The most frequently occurring acuity level on average was level 2 (9.73). Figure 2 shows the average distribution of patient acuity on the unit.

Figure 2

Distribution of Patient Acuity
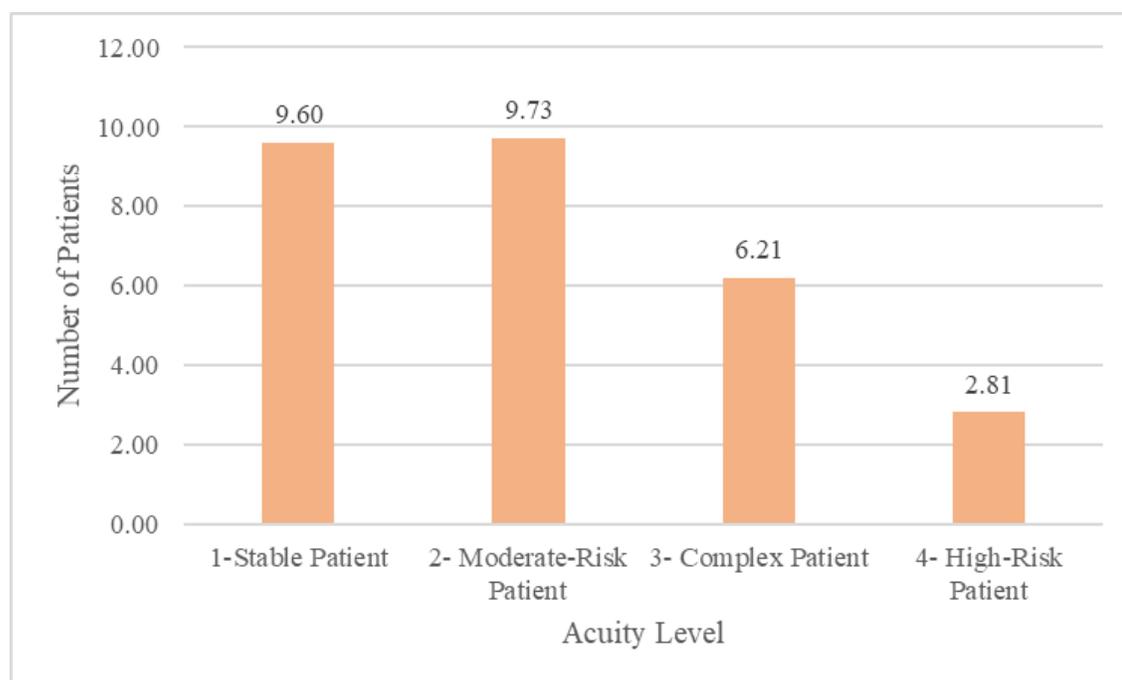
Workload distribution was analyzed for shift where acuity tools were completed for all patients on the unit. Adjustments were made for disparities in workload among nurses in some situations. On shifts where the charge nurse took a team of lower acuity patients, their workload score was excluded from the range. In a few cases, one nurse had a markedly higher workload score per request for continuity of care. In these cases, that nurse's workload score was excluded from the range. The study unit has two halls, and nurses are typically assigned to patients on one hall only. On shifts where patient acuity was higher on one hall, the workload score range for each hall was considered separately. The minimum nursing workload score ranged from 5-14 with a median of 10 and a mean of 9.81. The maximum workload score ranged from 7-16 with a median of 12 and mean of 11.98. The difference between the minimum and maximum workload scores were

calculated to determine workload distribution. Workload distribution ranged from 1-8

with a mean of 2.17.

The completion rate for the workload distribution survey was 46.15% (n=12) for

the pre-survey and 38.46% (n=10) for the post-survey. Chi-square and Fischer's Exact

tests determined that there were no differences in the demographic characteristics of the

pre- and post-survey groups. Survey demographics can be found in Table 3.

Table 3

Staff Survey Demographics

Variable		Pre		Post	
		n	%	*n*	%
Years of RN Experience	0-1 years	1	8.33	1	10
	2-5 years	4	33.33	3	30
	6-10 years	3	25.00	3	30
	11-15 years	1	8.33	1	10
	15+ years	3	25.00	2	20
Employment Status	Full-time	10	83.33	9	90
	Part-time	2	16.67	1	10
Shift	Day	6	50	5	50
	Night	6	50	5	50

A two-tailed independent samples *t*-test determined that significant increases were

observed in nurse' perception of fair and even workload distribution after tool

implementation. A significant increase was also found in nurses' perception that their

assessment of acuity was reflected in patient assignments. The difference in satisfaction

with current distribution of patient acuity approached significance. Survey results can be

found in Table 4.

Table 4

Staff Survey Results

	Pre (n=12)		Post (n=10)				
	M	SD	M	SD	t	p	d
I am satisfied with the current distribution of patient acuity in daily assignments.	2.50	1.09	3.50	1.18	-2.07	.052	0.88
Workload is distributed fairly and evenly among nurses regarding patient acuity.	2.42	1.00	3.40	0.84	-2.47	.023	1.07
The bedside RN's assessment of patient acuity is reflected in patient assignments.	2.42	1.08	4.00	0.82	-3.80	.001	1.65
The charge nurse considers patient acuity when making shift assignments.	3.00	1.21	3.20	1.40	-0.36	.722	0.15
Patient acuity affects my ability to complete my job to my satisfaction within my 12-hr shift.	4.17	1.27	4.40	1.07	-0.46	.650	0.20

Questions pertaining to use of the acuity tool were included in the post-survey.

See Table 5 for tool use results.

Table 5

Tool Use Questions (n=10)

	M	SD	Min	Max
The acuity tool was easy to use.	4.60	0.70	3.00	5.00
The acuity tool was effective in creating fair and equitable patient assignments.	3.90	0.74	3.00	5.00
I would be willing to continue utilizing the acuity tool on this unit.	3.30	1.25	1.00	4.00

Discussion

When acuity tools for all patients on the unit were completed, workload was distributed more evenly. There were three shifts in which the range in workload score was wide. The range on these shifts were 8, 6, and 5 and all occurred in the first week of tool implementation. Aside from these three shifts, the difference in workload scores ranged from 1-3. It is likely that the initial elevated values are reflective of the subjective method used to make patient assignments prior to tool implementation and that there was a learning curve that occurred in using the tools for assignments. Given that these instances all occurred in the first week suggests that the charge nurses adjusted their use of the information as they become comfortable using the data to make assignments.

Tool compliance was observed more frequently on the night shift. Lower compliance by the day shift nurses may be due to increased activity during day shift that could lead to less time to complete acuity tools including more patient turnover, presence of visitors and doctors, patient movement to tests, therapies, etc. Since acuity tools and assignments were completed for the oncoming shift, night nurses completing tools more often meant that the day shift was more likely to benefit from even workload distribution.

This project was limited by a low compliance level of both acuity tool use as well as staff surveys. Compliance with acuity tool use dropped off near the end of week three. This prompted increased reminders during shift change huddles and via email. Compliance increased for weeks 6-8 with more frequent reminders and encouragement from the PD as well as leadership. Future practice would benefit from increased surveillance and leadership involvement throughout implementation.

The significant increase in nurse perception of fair and even workload distribution indicates that nurses believe that workload is distributed more evenly after acuity tool implementation. However, there was no significant increase in the belief that charge nurses consider patient acuity when making patient assignments. The difference in scores between these two questions may indicate that nurses are attributing workload distribution to the tools more than efforts made by the charge nurse. Nurses did believe that their own assessment of patient acuity was taken into account. The mean score of nursing satisfaction with distribution of patient acuity increased, approaching significance. This combined with narrow workload score ranges when all tools were completed implies that the tool is effective when used correctly and consistently.

Consistent with findings by Firestone-Howard et al. (2017) and Al-Dweik & Ahmad (2019), survey respondents believed that the tool was easy to use and effective at creating fair and equitable assignments. However, responses regarding willingness to continue using the tool were neutral. It is possible that wanting to continue tool use was scored lower due to inconsistent use and therefore its benefits were not maximized.

The post-survey included a question of why or why not the nurse would be willing to continue use of the acuity tool. Only three participants completed this question

and all stated that the tool was helpful in evenly distributing workload when utilized correctly. Two respondents stated that they had difficulty getting nurses to complete the tools by the designated time. One respondent added that the tools would be effective if they were "handed out in enough time prior to the end of shift". This indicates a need for further education that the individual nurse should initiate the completion of acuity tools for their assigned patients rather than being prompted by the charge nurse. Another respondent suggested that post-op vital signs should not necessarily place a patient in the acuity level 3 and may falsely place patients in a higher acuity level than appropriate.

Recommendations

Continued use of an acuity tool on this unit could be beneficial for fair workload distribution and nursing satisfaction. Recommendations for next steps would begin with a discussion of this project with the Unit Practice Council. This discussion may include what, if any, changes should be made to the tool itself such as the survey suggestion of removing post-op vital signs as a level 3 indicator. An in-depth plan for increased tool education and surveillance of tool use should also be discussed. Measures such as including reminders in every shift change huddle and audits on tool use may increase compliance. It would also be beneficial to collaborate with leadership on other units that use acuity tools and discuss how compliance issues have been addressed. If even workload distribution and nursing satisfaction continue to improve with these interventions, it is recommended to consider expanding tool use to other units in the hospital.

Conclusion

  This project along with existing research indicates that the use of an objective acuity tool assists in distributing workload evenly with regards to nurse-patient assignments. Steps need to be made to increase compliance in order to experience the full benefits of acuity tool use. Increased education, surveillance, and leadership involvement could be beneficial to increase compliance. Acuity tool implementation increased nursing perception of workload being distributed more fairly and felt that their assessment of patient acuity was considered in patient assignments. Implementing measures to increase acuity tool compliance as well as some slight modifications to the tool itself has the potential to further increase nursing satisfaction and evenly distribute workload more consistently.

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Appendix A

Reference Matrix

CITATION	PURPOSE / BACKGROUND	PARTICIPANTS / SETTING	METHODS / DESIGN	RESULTS / LIMITATIONS / RECOMMENDATIONS
Author(s), Date, Title, Journal Information, doi	Purpose & Outcome Measures or Goals (Aims)	Sample & Setting	Study Design & Interventions	Results, Strengths/Weaknesses, Limitations, & Recommendations
DiClemente, K. (2018). Standardizing patient acuity: A project on a medical-surgical/cancer care unit. *MEDSURG Nursing*, *27*(6), 355–387.	Create and implement standardized and objective acuity tool for nurse-patient assignments to improve clinical outcomes and productivity	32-bed medical-surgical/cancer care unit in a 210-bed Illinois community hospital	Pretest-posttest Acuity scale created and implemented for each 12 hour shift over period of 8 weeks Pre/post surveys conducted to assess nursing knowledge and satisfaction with acuity model	Results: Staff reported increased knowledge of acuity model and perceptions of workload fairness and patient care increased Limitations: Some refusal to fill out acuity form, low survey completion, limited 8-week project duration Recommendations: longer survey period, strategies to improve staff participation, computerized program to tally acuity scores
Meyer, K. R., Fraser, P. B., & Emeny, R. T. (2020). Development of a nursing assignment tool using workload acuity scores. *Journal of Nursing Administration*, *50*(6), 322–327. https://doi-org.ezproxy.umsl.edu/10.1097/NNA.0000000000000892	Establish a fair and consistent practice for creating nursing assignments	400-bed tertiary care rural academic medical center in New England	Quantitative study EHR-generated patient workload scores and unit specific nurse-to-patient ratios were utilized to generate high, medium, and low nursing workload measurements for each unit	Results: Mean patient specific workload scores varied across hospital units; nursing workload measurement ranges were relatively consistent across institution when nurse-to-patient ratios were factored in Strengths: Large sample size and 12 month study period Limitations: Proprietary limitations of EHR vendor inhibits direct application to other institutions

CITATION	PURPOSE / BACKGROUND	PARTICIPANTS / SETTING	METHODS / DESIGN	RESULTS / LIMITATIONS / RECOMMENDATIONS
				Recommendations: survey staff to assess EHR workload measurement against nursing perception of workload
Hegney, D. G., Rees, C. S., Osseiran, M. R., Breen, L., Eley, R., Windsor, C., & Harvey, C. (2019). Perceptions of nursing workloads and contributing factors, and their impact on implicit care rationing: A Queensland, Australia study. *Journal of Nursing Management (John Wiley & Sons, Inc.)*, 27(2), 371–380. https://doi-org.ezproxy.umsl.edu/10.1111/jonm.12693	Explore nurses' perceptions of factors affecting workload and their impact on patient care	2,397 nurses in Queensland, Australia	Self-report cross sectional study using an online survey	Results: 20-40% reported being unable to provide care in the time available; >60% believed processes to address workload issues were inadequate
Chiulli, K. A., Thompson, J., & Reguin-Hartman, K. L. (2014). Development and implementation of a patient acuity tool for a medical-surgical unit. *Med-Surg Matters*, 23(2), 1–12.	Utilize an objective tool to assign acuity ratings, adjust staffing ratios, and balance workload for maximized safe and effective care	36-bed medical surgical unit of a 148-bed community hospital Trial phase: 40 nurses assessed 183 patients using acuity tool Implementation phase: 43 nurses	Method comparison study Acuity tool was created after roundtable discussions open to all staff Acuity ratings using the tool were compared to traditional subjective method used by charge nurses	Results: subjective method identified 51% of patients as level 2, 49% of patients as level 3, and 0% as level 4; implementation of acuity tool identified 51% level 2, 38% level 3, and 12% level 4 Strengths: simplicity, cost, and customization

CITATION	PURPOSE / BACKGROUND	PARTICIPANTS / SETTING	METHODS / DESIGN	RESULTS / LIMITATIONS / RECOMMENDATIONS
		assessed 488 patients using tool		Limitations: did not measure nurse satisfaction, patient outcomes after implementation Recommendations: data collection on outcome measures after implementation phase
Ayan, G., & Türkmen, E. (2020). The transcultural adaptation and the validity and reliability of the Turkish Version of Perroca's Patient Classification Instrument. *Journal of Nursing Management (John Wiley & Sons, Inc.)*, 28(2), 259–266. https://doi-org.ezproxy.umsl.edu/10.1111/jonm.12916	Examines the reliability and validity of the Turkish version of Perroca's Patient Classification instrument to aid nurse managers in determining patient acuity levels for measuring nursing workloads	300 hospitalized patients in a private hospital in Istanbul, Turkey	Validity and reliability assessment Stage 1) transcultural adaptation process Stage 2) validity and reliability assessment of Turkish version of Perroca's PCI	Results: scale content validity index of 0.93; Cronbach's alpha coefficient of 0.86; Cohen's kappa coefficient of 0.826 Limitations: only 2 raters for the Perroca's PCI as a rating scale Recommendations: this instrument may be used to assess patient acuity and measure nursing workloads; further studies needed on measurement of nursing workload and comparison of nurse/patient outcomes in different hospitals/populations
Carter, K. F., & Burnette, H. D. (2011). Creating Patient-Nurse Synergy on a Medical-Surgical Unit. *MEDSURG Nursing*, 20(5), 249–254.	Implement Synergy Model on a medical-surgical unit and analyze patient and employee satisfaction	36-bed medical-surgical unit consisting of adult and pediatric patients (Magnet hospital in a rural college community)	Synergy model was adopted on medical-surgical unit; Procedures were implemented for patient acuity assessment, room assignment, and nurse competency assessment	Results: 11% increase in overall engagement reported by nurses; nurse satisfaction with facility remained in 97th percentile; decreased average length of stay, increased patient satisfaction, and decreased falls observed in the year the model was implemented
Al-Dweik, G., & Ahmad, M. (2019).	Describe effectiveness of	64 registered nurses of medical-surgical	Quasi-experimental design	Results: Significant increases in nurse's overall satisfaction as well as

CITATION	PURPOSE / BACKGROUND	PARTICIPANTS / SETTING	METHODS / DESIGN	RESULTS / LIMITATIONS / RECOMMENDATIONS
Matching nursing assignment to patients' acuity level: The road to nurses' satisfaction. Journal of Nursing Measurement, 27(1), E34–E47. https://doi-org.ezproxy.umsl.edu/10.1891/1061-3749.27.1.E34	Perroca's patient acuity tool and measure nurse's satisfaction on acuity tool implementation	wards of a private hospital in Jordan	Implementation of Perroca's acuity tool followed by nurse satisfaction surveys	satisfaction with workload and standard of care Limitations: Small sample size, nurse resistance, study hospital lacked computer documentation Recommendations: Create policy linking patient assignment to patient acuity, integrate acuity into computerized documentation systems
Perroca, M. G. (2011). Development and Content Validity of the New Version of a Patient Classification Instrument. Revista Latino-Americana de Enfermagem (RLAE), 19(1), 58–66. https://doi-org.ezproxy.umsl.edu/10.1590/S0104-11692011000100009	Reconstruct Perroca's patient classification instrument and assess content validity of new version	Expert panel of 10 PhD and Master's prepared nurses in Brazil	Delphi technique Electronic questionnaires	Results: Nine care areas were agreed upon (decreased from 13) and divided into four acuity levels, all points were agreed upon by experts using the Delphi technique, agreement levels from 80-96% in care areas Limitations: Administrative activities not taken into account Recommendations: Implement new tool in patient care areas
Al-Dweik, G., & Ahmad, M. (2020). The effect of patients' acuity level on nurses shift assignment in Jordan: A qualitative	Explore nurse's perspectives on assignment process after implementing Perroca's acuity tool	13 participants (7 nurse managers and 6 registered nurses) on medical-surgical wards of a private	Qualitative approach with two focus group discussions	Results: Increased nurse perception on quality of care and enabled more effective nursing time management Limitations: Gender preferences of patients play large role in

CITATION	PURPOSE / BACKGROUND	PARTICIPANTS / SETTING	METHODS / DESIGN	RESULTS / LIMITATIONS / RECOMMENDATIONS
approach. Journal of Nursing Measurement. https://doi-org.ezproxy.umsl.edu/10.1891/JNM-D-18-00101		teaching hospital in Jordan		assignments, functional care model applied due to short staffing Recommendations: Creating policy for PAT use, increased organizational support
Firestone-Howard, B., Zedreck Gonzalez, J. F., Dudjak, L. A., Ren, D., & Rader, S. (2017). The effects of implementing a patient acuity tool on nurse satisfaction in a pulmonary medicine unit. Nursing administration quarterly, 41(4), E5–E14. https://doi.org/10.1097/NAQ.0000000000000254	Implement patient acuity tool to increase equity and satisfaction with nurse assignments	35 registered nurses on a 40-bed pulmonary medicine unit of magnet designated hospital	Pre/post-survey design quality improvement project Focus group sessions Implementation of Harper and McCully acuity tool	Results: PAT increased nurse satisfaction and equity as well as professional autonomy and nurse-nurse communication Limitations: No designated charge nurse at night, interrater reliability not tested Recommendations: Blind-pairing pre and post-survey results

Appendix B

Data Tracking Tool

Week 1	Census	Discharges	Admissions	Acuity Tools Completed	Green (1) Patients	Yellow (2) Patients	Orange (3) Patients	Red (4) Patients	Workload Score Range	Total RNs	Unit RNs	Agency RNs	Float/Pulled RNs	Off-staff Charge (Y/N)
Sun-AM														
Sun-PM														
Mon-AM														
Mon-PM														
Tues-AM														
Tues-PM														
Wed-AM														
Wed-PM														
Thurs-AM														
Thurs-PM														
Fri-AM														
Fri-PM														
Sat-AM														
Sat-PM														

Appendix C

5 East Patient Acuity Tool

5 East Patient Acuity Tool	1- Stable Patient	2- Moderate-risk Patient	3- Complex Patient	4- High-risk Patient
Clinical Severity Indicators				
Assessment	• Q8h VS • Alert & Oriented	• Q4h VS • CIWA</8	• Post-op VS • Delirium/AMS • CIWA >8	• Unstable VS (determined by ordered parameters)
Respiratory	• Stable on room air	• Oxygen </ 2L via NC	• Oxygen >2L via NC • Tracheostomy	• Oxygen via mask • Can't maintain secretions independently
Cardiac	• VS WNL or at baseline	• Low-grade temp (99-100.6 F) • HR>120	• Change in BP • Temp >100.6 F • HR>140	• Unstable rhythm • A-fib or PE
Medications & Therapeutic Protocols	• PO/IVPB • Blood glucose normal	• TPN • Heparin gtt • Blood glucose requiring notifying provider • Unit collect • Dialysis	• CBI • 1 unit blood transfusion • Fluid bolus	• >1 unit blood product transfusion
Drainage Devices	• </2 drains (JP, neph tube, abscess drain, etc.)	• CT to water seal • NG/dobhoff • Continuous tube feeding	• CT to suction • Meds via tube • Bolus tube feeding	• High output drains (emptying Q1h) • Chest tube output >100ml/2h)
Pain Management	• Pain well managed with PO/IV meds Q4h	• Epidural/PCA • Nausea/vomiting	• Q2 Pain meds	• Uncontrolled pain with multiple pain devices (IV, IM, PO, etc.)
Nurse Workload Indicators				
Admit/DC/Transfer	• Stable transfer • Routine discharge	• Discharge to outside facility	• New admission • Complex discharge • Discharge to hospice	• Complicated post-op • Transfer to higher level of care
Education/Psychosocial	• Calm, cooperative	• Anxious/slightly agitated • New diabetic • New CHF	• New trach/amputee • Translator needed • Requires consistent assistance (>Q1h)	• CMO/end-of-life care
Wound/Ostomy/Continence	• Daily/BID dressing change • Wound vac • X1 assist to bathrobe/bedpan	• Ostomy/FMS • Enema • Bowel prep • Incontinent	• TID/complex dressing changes • High-output ostomy	• Active drainage (change >Q30min or >TID) • Q1h toileting needs

			• Multiple wound vacs or vac requiring frequent troubleshooting	
ADLs/Isolation	• Independent with ADLs • Standard precautions	• Assist with ADLs • X2 assist out of bed • Isolation (contact, enteric contact)	• Turns Q2h • Bedrest • Airborne isolation	• Paraplegic or quadriplegic • Total care/lift
Safety	• Fall risk	• Sitter 1:1	• Bed alarm without sitter • Sensory deficits (blind, deaf, etc.)	• Highly agitated • Restraints
Patient Score	**Most=1**	**Two or more=2**	**Any=3**	**Any=4**

Appendix D

Pre-intervention Survey

1. Please indicate your years of RN experience.

    0-1 year 2-5 years 6-10 years 11-15 years Over 15 years

2. Please indicate your employment status.

    Full-time Part-time PRN

3. Please indicate your assigned shift.

    Days (7:00AM-7:30PM)   Nights (7:00PM-7:30AM)

4. Describe your satisfaction with the current distribution of patient acuity in your daily shift assignments.

    Completely dissatisfied 1 2 3 4 5 Completely satisfied

5. Workload is distributed fairly and evenly among nurses regarding patient acuity.

    Completely disagree 1 2 3 4 5 Completely agree

6. The bedside RN's assessment of patient acuity is reflected in patient assignments.

    Completely disagree 1 2 3 4 5 Completely agree

7. The charge nurse considers patient acuity when making shift assignments.

    Completely disagree 1 2 3 4 5 Completely agree

8. Patient acuity affects my ability to complete my job to my satisfaction within my 12-hr shift.

    Completely disagree 1 2 3 4 5 Completely agree

Appendix E

Post-intervention Survey

1. Please indicate your years of RN experience.

   0-1 year   2-5 years   6-10 years   10-15 years   Over 15 years

2. Please indicate your employment status.

   Full-time   Part-time   PRN

3. Please indicate your assigned shift.

   Days (7:00AM-7:30PM)   Nights (7:00PM-7:30AM)

4. Describe your satisfaction with the current distribution of patient acuity in your

   daily shift assignments.

   Completely dissatisfied   1   2   3   4   5   Completely

   satisfied

5. Workload is distributed fairly and evenly among nurses regarding patient acuity.

   Completely disagree   1   2   3   4   5   Completely agree

6. The bedside RN's assessment of patient acuity is reflected in patient assignments.

   Completely disagree   1   2   3   4   5   Completely agree

7. The charge nurse considers patient acuity when making shift assignments.

   Completely disagree   1   2   3   4   5   Completely agree

8. Patient acuity affects my ability to complete my job to my satisfaction within my

   12-hr shift.

   Completely disagree   1   2   3   4   5   Completely agree

9. The acuity tool was easy to use.

   Completely disagree   1   2   3   4   5   Completely disagree

10. The acuity tool was effective in creating fair and equitable patient assignments.

Completely disagree   1   2   3   4   5   Completely disagree

11. I would be willing to continue utilizing the acuity tool on this unit.

Completely disagree   1   2   3   4   5   Completely disagree

12. Please explain why you would or would not be willing to continue use of the

acuity tool.

Appendix F

Charge Nurse Education

- Print copy of unit census at 1700 and 0500

- Completed acuity tools should be turned in or collected at 1700 and 0500

- When making assignments, distribute high acuity patients first

    o Evenly distribute red patients first, followed by orange, green, then yellow

        - Try to avoid assigning a red and orange patient to the same nurse

        - Use green patients to balance out higher acuity patients

        - For every red patient, assign two green patients if possible

        - Fill in remaining spots with yellow patients

- Add each nurse's workload score and compare to assess for even distribution

    o Green=1, Yellow=2, Orange=3, Red=4

    o Aim to keep workload score within 2 points for all nurses

- Consider continuity of care as long as it does not result in a workload disparity