Intensive Care Unit: Acuity Tool Certification

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Name of Proposed Acuity Tool:	*QuadraMed AcuityPlus*
Acuity Tool Format:	*Electronic*
Intensive Care Units in which the acuity tool will be deployed:	Shapiro 6W - Cardiac Surgical ICU Shapiro 9E - Cardiac Care Unit Tower 9CD - Neuro ICU Tower 3BC- Medical ICU Tower 11C - Thoracic ICU Tower 8CD – Surgical/Burn-Trauma ICU CWN 6BCD – Neonatal ICU

I. Acuity Tool Description

QuadraMed AcuityPlus Inpatient methodology is comprised of three components:

1) clinical indicators (see Exhibit A for list of clinical indicators and definitions)

2) patient turnover, and

3) activities requiring additional care (see Exhibit B for list of 1 Hour+ Activities and definitions)

The clinical indicators account for the variance in the patient's needs for nursing care and are allocated on weight based on the indicators' correlation to predicting care needs. The patient turnover component captures the relative care needs related directly to the admission, transfer and discharge process of patient care. Patient activities that require additional nursing care include both bedside procedures and events and instances where the RN needs to stay with a patient to meet their care needs when an off-unit procedure or activity is performed.

The validation of the AcuityPlus Inpatient Methodology included extensive analysis. Clinical nurses were used extensively in the development and testing of the methodology. The methodology was tested against several other measures of patient care including similar methodologies, patient work sampling and clinical expert estimates of patient care hour requirements. Transportability was insured through validation in various institution sizes, types, locations, and across various clinical specialties, patient ages and demographics. Specifically, multiple ICU units participated in the AcuityPlus validation study including CCU, Medical ICU, Surgical ICUs, Medical/Surgical

ICUs, Cardiovascular ICU, Neuro ICUs, Trauma ICUs, Burn ICUs, Pediatric ICUs and Neonatal ICUs. The QuadraMed AcuityPlus conceptual approach of basing workload on patient needs allows for standardized measurement of patient workload regardless of location. This process is supported by educating staff on the appropriate application of the indicators in the various unit settings. Thus, the QuadraMed AcuityPlus system can be used to determine the patient's needs for care in all ICUs.

II. Methodology for Scoring Acuity

Patients are classified upon admission or transfer into a unit and then once per shift. The Staff Nurse assigned to the patient selects the relevant clinical indicators within the electronic AcuityPlus application for the patient (see Exhibit C for Window Used by Staff RN to Classify Patient). The clinical indicators are allocated on weight based on the clinical indicators' correlation to predicting nursing care needs. The total points of the clinical indicators applicable to each patient determine the category or patient type (Type 1 through 6, with 6 requiring the most nursing care). Each patient type corresponds to a range of required nursing care hours (see Exhibit C for Staff Nurse View of QuadraMed Patient Classification Selection Screen and Exhibit D for Patient Type Chart and description of how direct care hours are calculated).

When applicable, 1 hour+ activity indicators are entered for specific patients and for specific durations of time. As is the case with the overall Quadramed AcuityPlus inpatient methodology, the intent is to capture the patients' need for nursing care. As such, the 1 hour+ activity indicators include work done by both the RN and the non-RN direct nursing care staff. These indicators do not affect individual patient acuity and patient type score. One-hour plus activities are designed to capture relatively infrequent activity that can significantly impact work on the patient care unit and impact direct care nursing resources at specific times. The time associated with the duration of the activity(s) is captured in the unit's total workload measurement, and as such, is included in the recommended staffing for the patients on the unit.

The QuadraMed AcuityPlus tool supports the work of the nurses, but does not replace the RN's clinical judgment about the care needs of the patient.

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III. Indicators Included

| | Clinical Indicators of Patient Stability | Please see Exhibits A, B and C for screen shots of AcuityPlus indicators, indicator definitions and patient classification screens as viewed by the staff nurse who classifies the patient.

The QuadraMed AcuityPlus patient classification process is a composite of all clinical indicators. Complexity of Care is a measurement captured by the patient classification process. The Complexity of Care Measure provides a measure of the patient's needs for professional RN care within the required hours of care. This information may be used in the patient assignment process, facilitating the assigning of the most experienced and skilled staff to the patient's with the highest complexity of care measure.

The patient's age is captured in the software via the interface to the electronic admission, discharge and transfer system; the gestational age of neonates is not explicitly captured though it is required knowledge for the assigned care team. The QuadraMed AcuityPlus methodology does not require a patient's age in order to make a determination of the patient's need for nursing care. For example, Infant A, 32 weeks gestation may have pulmonary issues requiring ventilator support where Infant B, 32 weeks gestation also has pulmonary issues, yet doesn't require ventilator support. Additionally, the infants may respond to treatment differently. |
|---|---|---|
| X | Physiological status | |
| X | Clinical complexity* | |
| X | Related scheduled procedures | |
| X | Medications and therapeutic supports | |
| | Indicators of Staff Nurse Workload | |
| ☐ | Patient age | |
| X | Patient and family communication skills and cultural/linguistic characteristics | |
| X | Patient and family education | |
| X | Family and other support | |
| X | Care coordination | |
| X | Transitional care and discharge planning | |

*Note: Clinical complexity is a composite of all defined indicators.

IV. For the ICU(s) listed above, please briefly describe how your acuity tool meets the unique care needs and circumstances of the patient population in that ICU

The conceptual approach of basing nursing workload on patient needs allows for standardized measurement of patient workload regardless of location. According to the QuadraMed methodology, if a critical post-operative patient is admitted to a Medical ICU or a Surgical ICU or a mixed population ICU, the patient's needs for care are the same. The patient would fall into the same category or type (1 through 6 referenced previously), regardless of the patients' geographical location. Thus, one acuity system can be used to determine the patient's needs for care in all ICU units. That being said, below are examples of some "typical" patients who may be cared for in each of our ICUs and how the QuadraMed AcuityPlus tool captures their distinct needs.

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Shapiro 9E - Cardiac Care Unit

Mr. S is a 56 year old man who was admitted to the CCU s/p PEA arrest related to heroin overdose. PMH COPD (active smoker), ETOH abuse, heroin abuse, and malnutrition.

Brief review of 3 week hospitalization: he successfully was cooled/rewarmed with therapeutic hypothermia protocol and has woken up, with an impaired mental status that continues to improve slowly; respiratory failure s/p 3 intubations due to hypoxemic respiratory failure and necessitating tracheostomy on this day of classification; total body drug rash from antibiotic which has blistered and is weeping in diffuse areas of his body; perforated duodenum; profound myopathy; withdrawal from opiates; anemia & pneumonia.

Quadramed Indicator Documentation

ADL-Self/Minimal Care	
ADL-Partial Care	
ADL-Complete Care	X
ADL-Rehabilitative	X
ADL Assistance-2-3 Caregivers	X
ADL Assistance-4 or more Caregivers	
Communication Support	X
Cognitive Support	X
Behavior/Emotional Management	
Behavior/Emotional MGT-q 1 Hour	X
Safety Management- q 2 Hours	X
Safety Management - q 30 Minutes	
Isolation Precautions (Transmission-Based)	

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Physiological Assessment- q 4 Hours	
Physiological Assessment- q 2 Hours	
Physiological Assessment- q 1 Hours	X
Physiological Assessment- q 30 Minutes	
Medication Prep >= 20 Minutes	X
Wound/Injury Management	X
Wound/Injury Mgmt >= 30 Minutes	
Healthcare Mgmt Education >= 1 Hour	X
1 to 1 Physiological Interv. >= 2 Hours	

Explanation of indicators:

- **ADL Complete Care:** Mr. S is unable to perform any of his ADLs. He is completely dependent on staff to reposition his limbs and hold him over for care. He is unable due to weakness and cognitive impairment to participate in a meaningful way.

- **ADL Rehabilitative:** Mr. S is undergoing daily rehab with nursing staff as well as PT to assist him to restore physical function and relearn some of his basic care needs.

- **ADL Assistance 2-3 Caregivers:** Requires 2-3 staff for provision of ADLs, cannot be accomplished with single provider.

- **Communication Support:** Due to his trach, he is unable to verbalize his needs/answer questions. He communicates through nodding his head in response to questions. At times he is able to gesture his needs.

- **Cognitive Support:** He has suffered anoxia related to his arrest and needs frequent reorientation and behavioral redirection.

- **Behavior/Emotional Management Q1 hour:** He is experiencing withdrawal from opiates. He is very anxious and his anxiety responds best to having his RN at his bedside, reassuring him and re-orienting him much of every hour.

- **Safety Management Q2 hours:** He requires bilateral soft wrist restraints due to his impulsivity and risk for detachment from ventilator.

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- **Physiologic Assessment Q1 hour:** Vital signs are assessed & documented Q1H. He is on medications that are titrated accordingly, at times also Q1H.

- **Medication Prep >= 20 minutes:** Multiple medications are crushed and administered via dobhoff tube throughout the day. He also required a blood transfusion.

- **Wound/Injury Management:** The diffuse open and weeping areas of skin require ointment application; his trach site needs to be cleaned regularly and the skin around trach protected.

- **Healthcare Management >= 1 hour:** Team meeting with the patient and his family in the morning for >1 hour to discuss the need for the tracheostomy as well as plans for needing rehab facility upon discharge.

Tower 9CD - Neuro ICU

Mrs. F is a 76 female with a past medical history significant for hypertension, Type 2 diabetes, hyperlipidemia, and dementia.

The patient is primarily Cambodian speaking so her history is supplied by family present at bedside. Patient's daughter went to bring the patient dinner at approximately 3PM and she was found slumped over her chair with evidence of emesis. In addition, patient was reportedly sleepier than normal. Based on these symptoms, she was brought to Salem Hospital for evaluation where CT Head demonstrated a large right sided multi-compartment cerebellar hemorrhage. Hospital course has been complicated by bacteremia, pneumonia, respiratory failure, Heparin induced thrombocytopenia, multiple intubations and at present a prolonged intubation due to right lung empyema. Pt continues to have poor neurologic exam and communication has been challenging due to language barriers and difficult family dynamics. Pt is scheduled for surgery today for VATS procedure for empyema drainage. Patient has multiple tubes/lines/drains including oral ETT, oral gastric tube, Arterial line, foley catheter, chest tube and multiple peripheral IV's.

Quadramed Indicator Documentation

ADL-Self/Minimal Care	
ADL-Partial Care	
ADL-Complete Care	X
ADL-Rehabilitative	

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ADL Assistance-2-3 Caregivers	X
ADL Assistance-4 or more Caregivers	
Communication Support	X
Cognitive Support	
Behavior/Emotional Management	
Behavior/Emotional MGT-q 1 Hour	
Safety Management- q 2 Hours	
Safety Management - q 30 Minutes	
Isolation Precautions (Transmission-Based)	
Physiological Assessment- q 4 Hours	
Physiological Assessment- q 2 Hours	
Physiological Assessment- q 1 Hours	X
A Physiological ssessment- q 30 Minutes	
Medication Prep >= 20 Minutes	X
Wound/Injury Management	X
Wound/Injury Mgmt >= 30 Minutes	
Healthcare Mgmt Education >= 1 Hour	
1 to 1 Physiological Interv. >= 2 Hours	

Explanation of indicators:

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- **ADL Complete Care:** Mrs. F. is unresponsive and unable to participate in any of her care needs and therefore is completely dependent on staff for all activities of daily living.

- **ADL Assistance 2-3 Caregivers:** She requires 2 staff to assist with turning and repositioning as well as to get her out of bed with the ceiling lift.

- **Communication Support:** There is a language barrier with her husband requiring a translator for all communication with him though her adult children do speak English.

- **Physiological Assessment:** Vital signs are assessed & documented Q1H.

- **Med prep >= 20 min:** Multiple medications are crushed and administered via the orogastric tube throughout the day.

- **Wound injury mgt:** Pt has multiple drains including chest tubes requiring dressing changes as well as a subdural hematoma requiring assessment for extension of the bleed.

Shapiro 6W-Cardiac Surgery ICU

Mrs. H. is a 71 y/o female with a past medical history of Type I diabetes and cardiomyopathy.

She is post-op day number 7, status post implantation of a Heartmate II ventricular assist device (VAD). She is experiencing hemodynamic instability requiring many VAD changes; she is on IV vasopressors including Milrinone for high peak arterial pressures and Epinephrine for right sided heart failure. She is on 6L O2 via nasal prongs and she has a Foley catheter. She is experiencing ICU delirium and is CAM + requiring 1:1 observation for screaming, pulling lines and biting her husband. She is on the Portland Protocol with q1 hour blood sugar checks. She requires 2 people to assist with all activity; other needs include VAD, PA line and arterial line care.

Quadramed Indicator Documentation Sheet

ADL-Self/Minimal Care	
ADL-Partial Care	
ADL-Complete Care	X
ADL-Rehabilitative	

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ADL Assistance-2-3 Caregivers	X
ADL Assistance-4 or more Caregivers	
Communication Support	
Cognitive Support	X
Behavior/Emotional Management	
Behavior/Emotional MGT-q 1 Hour	X
Safety Management- q 2 Hours	
Safety Management - q 30 Minutes	X
Isolation Precautions (Transmission-Based)	
Assessment- q 4 Hours	
Assessment- q 2 Hours	
Assessment- q 1 Hours	X
Assessment- q 30 Minutes	
Medication Prep >= 20 Minutes	
Wound/Injury Management	
Wound/Injury Mgmt >= 30 Minutes	X
Healthcare Mgmt Education >= 1 Hour	
1 to 1 Physiological Interv. >= 2 Hours	

Explanation of indicators:

- **ADL Complete Care:** Mrs. H. is unable to perform any of her ADL's independently due to weakness and cognitive impairment.

- **ADL Assistance 2-3 Caregivers:** She requires 2-3 staff for turning and repositioning.

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- **Cognitive Support**: She is experiencing delirium and requires frequent reorientation and redirection.

- **Behavior/Emotional Management q1 hour**: Due to the delirium she is experiencing she requires redirection at least once an hour to manage her impulsive behavior, her family also requires frequent reassurance and updates from staff.

- **Safety Management q30 minutes**: She requires a 1:1 PCA at her bedside at all times to maintain her safety in the setting of her delirium.

- **Physiologic Assessment Q1H**: Vital signs and blood sugar are assessed & documented every hour. She is also on IV medications that are titrated according to her hemodynamic status and which are monitored at least every hour.

- **Wound/Injury Management >/= 30 minutes**: The VAD, sternal wound, A line and PA line sites require at least 30 minutes or greater of consecutive time to manage.

Tower 3BC-Medical ICU

Ms. A. is a 40 year old woman with breast cancer, status post multiple rounds of chemotherapy.

She was admitted from home with aspiration pneumonia and was subsequently intubated for hypoxemic respiratory failure and had a prolonged intubation. She was extubated 2 days ago. The patient is at high risk for aspiration after failing many speech and swallow studies and has an altered mental status. She is on 6L O2 via nasal cannula and is dependent on staff for all care secondary to profound weakness. She is VRE +.

Quadramed Indicator Documentation

ADL-Self/Minimal Care	
ADL-Partial Care	
ADL-Complete Care	X
ADL-Rehabilitative	

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ADL Assistance-2-3 Caregivers	X
ADL Assistance-4 or more Caregivers	
Communication Support	X
Cognitive Support	X
Behavior/Emotional Management	
Behavior/Emotional MGT-q 1 Hour	
Safety Management- q 2 Hours	
Safety Management - q 30 Minutes	X
Isolation Precautions (Transmission-Based)	X
Physiological Assessment- q 4 Hours	
Physiological Assessment- q 2 Hours	
Physiological Assessment- q 1 Hours	X
Physiological Assessment- q 30 Minutes	
Medication Prep >= 20 Minutes	X
Wound/Injury Management	X
Wound/Injury Mgmt >= 30 Minutes	
Healthcare Mgmt Education >= 1 Hour	
1 to 1 Physiological Interv. >= 2 Hours	

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Explanation of indicators:

- **ADL Complete Care:** Mrs. H. is unable to perform any of her ADL's independently due to weakness.

- **ADL Assistance 2-3 Caregivers:** She requires 2-3 staff for turning and repositioning.

- **Communication Support:** The primary language of the patient and family is Spanish.

- **Cognitive Support**: The patient is delirious and needs frequent re-orientation and reminders not to reach for her Dobhoff tube.

- **Safety Management q30 minutes**: The patient needs constant observation and intermittent restraint use for agitation and delirium.
- **Isolation Precautions:** She is on contact precautions.

- **Physiologic Assessment Q1H**: She requires hourly hemodynamic monitoring, and experiences frequent desaturations requiring nasotracheal suctioning.

- **Med prep >=20 min:** She has a Dobhoff tube through which she receives her non-IV meds requiring > 20 consecutive minutes to crush and administer, she is also on multiple IV meds requiring significant time to prepare and administer.

- **Wound/Injury Management:** She has sacral decubiti ulcers requiring twice per day dressing changes.

Tower 8CD – Surgical/Burn Trauma ICU; Surgical Patient Example

Ms. B. is a 53 year old female patient with a history of Crohn's disease and metastatic rectal cancer to the lungs status post thoracentesis and pleurex catheter placement.

She is admitted status post exploratory laparotomy with ileocolic resection and a stapled anastamosis. Post op issues include acute kidney injury secondary to poor PO intake and malnutrition requiring TPN. On post op day #12 she became short of breath, tachycardic with desaturated O2 levels. She was readmitted to the ICU, intubated, sedated and initially paralyzed due to non-compliance with the ventilator. She is currently able to follow commands but is restless, attempting to communicate by mouthing words around the ET tube. She is in two point soft restraints and is on contact precautions. She is anxious at times and shaking head back and forth, emotional support also provided to pt's family members who came in briefly.

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Quadramed Indicator Documentation

ADL-Self/Minimal Care	
ADL-Partial Care	
ADL-Complete Care	X
ADL-Rehabilitative	
ADL Assistance-2-3 Caregivers	X
ADL Assistance-4 or more Caregivers	
Communication Support	X
Cognitive Support	
Behavior/Emotional Management	X
Behavior/Emotional MGT-q 1 Hour	
Safety Management- q 2 Hours	X
Safety Management - q 30 Minutes	
Isolation Precautions (Transmission-Based)	X
Physiological Assessment- q 4 Hours	
Physiological Assessment- q 2 Hours	
Physiological Assessment- q 1 Hours	X
Physiological Assessment- q 30 Minutes	
Medication Prep >= 20 Minutes	

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Wound/Injury Management	X
Wound/Injury Mgmt >= 30 Minutes	
Healthcare Mgmt Education >= 1 Hour	
1 to 1 Physiological Interv. >= 2 Hours	

Explanation of indicators:

- **ADL Complete Care:** She is unable to perform any of her ADL's independently.

- **ADL Assistance 2-3 Caregivers:** She requires 2 nurses for turning and boosting.

- **Communication Support:** She tries to speak around the ETT in order to communicate with providers, mouthing words and gesturing to get her needs met.

- **Behavioral/emotional Management:** She has a RASS score of +1-+2 and is anxious at times and shaking her head back and forth. Emotional support was also provided to the patient's family members who came in briefly.

- **Safety Management q2 hours**: She is in bilateral soft wrist restraints and requires monitoring for safety to ensure she does not pull out her ETT.

- **Isolation Precautions:** She is on contact precautions.

- **Physiologic Assessment Q1H:** She requires hourly assessments of Train of Four, blood sugar and vital signs.

- **Wound/Injury Management:** She has an abdominal wound that requires once a day dressing changes of less than 30 minutes.

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Tower 8CD – Surgical/Burn Trauma ICU: Burn Patient Example

Mr. S. is a 51 y/o M with a past medical history of hyperlipidemia.

He is admitted with trimethylaluminum exposure and chemical explosion resulting in 10% TBSA, likely superficial and deep second degree burns, to the head and neck, with inhalational injury, necessitating intubation and urgent transfer to BWH for burn wound management.

Quadramed Indicator Documentation Sheet

ADL-Self/Minimal Care	
ADL-Partial Care	
ADL-Complete Care	X
ADL-Rehabilitative	
ADL Assistance-2-3 Caregivers	X
ADL Assistance-4 or more Caregivers	
Communication Support	X
Cognitive Support	X
Behavior/Emotional Management	X
Behavior/Emotional MGT-q 1 Hour	
Safety Management- q 2 Hours	X
Safety Management - q 30 Minutes	
Isolation Precautions (Transmission-Based)	X
Assessment- q 4 Hours	

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Assessment- q 2 Hours	
Assessment- q 1 Hours	X
Assessment- q 30 Minutes	
Medication Prep >= 20 Minutes	
Wound/Injury Management	
Wound/Injury Mgmt >= 30 Minutes	X
Healthcare Mgmt Education >= 1 Hour	

Explanation of indicators:

- **ADL Complete Care:** He is unable to perform any of his ADL's independently.

- **ADL Assistance 2-3 Caregivers:** He requires 3 nurses for all turns.

- **Communication Support:** He is writing notes to staff frequently to communicate since he is intubated and unable to speak.

- **Cognitive Support:** He is requiring frequent reorientation. He keeps asking for clarification on what had brought him into the hospital and the events surrounding his burn.

- **Behavioral/emotional Management:** He is anxious about his situation and that of his co-workers that were involved in the accident. He requires frequent intervention to reassure him of the well being of himself and his co-workers.

- **Safety Management q2 hours**: He requires soft wrist restraints secondary to intubation and the risk of extubation.

- **Isolation Precautions:** He is on contact precautions related to his burn injury.

- **Physiologic Assessment Q1H:** He requires hourly assessments of vital signs.

- **Wound/Injury Management >/= 30 minutes:** His wound care took 2 hours.

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Tower 11C - Thoracic ICU

Mr. C. is a 50 y/o male patient with a past medical history of hypertension, hypothyroidism, asthma, ascending aortic aneurysm, DVT, PE and esophageal cancer s/p chemo and radiation. He is day 2 post-op for a minimally invasive esophagectomy.

Quadramed Indicator Documentation Sheet

ADL-Self/Minimal Care	
ADL-Partial Care	
ADL-Complete Care	X
ADL-Rehabilitative	X
ADL Assistance-2-3 Caregivers	X
ADL Assistance-4 or more Caregivers	
Communication Support	
Cognitive Support	
Behavior/Emotional Management	X
Behavior/Emotional MGT-q 1 Hour	
Safety Management- q 2 Hours	X
Safety Management - q 30 Minutes	

Isolation Precautions (Transmission-Based)	
Assessment- q 4 Hours	
Assessment- q 2 Hours	
Assessment- q 1 Hours	X
Assessment- q 30 Minutes	
Medication Prep >= 20 Minutes	
Wound/Injury Management	X
Wound/Injury Mgmt >= 30 Minutes	
Healthcare Mgmt Education >= 1 Hour	
1 to 1 Physiological Interv. >= 2 Hours	

Explanation of indicators:

- **ADL – Complete Care:** The patient requires assistance for ADL's (AM Care, dressing, oral care). He is unable to dress himself and requires full assistance with hospital gowns and AM care.

- **Rehabilitative:** The patient is up and out of bed 3-4 times a day to ambulate. He requires assistance with learning to use the thoracic walker, assistance with standing from the chair or bed & assistance with ambulating.

- **Assist 2-3 Caregiver:** It requires 2 people to steady the patient when standing and moving from the bed to the chair or the chair to the bed. He also requires 2 staff to assist when walking.

- **Behavior & Emotional Management:** The patient had a very difficult night with anxiety due to trouble clearing secretions. This is chosen because of the emotional support/ talk support provided to the patient with regard to dealing with the anxiety related to difficulty breathing & recovering from a major surgery.

- **Safety Management q2 Hours:** Pt is a fall risk with a Morse fall score of >45 & has (+) for ABCS of harm post-op both of which require a safety assessment at least every 2 hours.

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- **Physiological Assessment Q1 Hour:** The patient requires assessment of his vital signs every hour and requires hourly intake and output monitoring.

- **Wound Injury Management:** The patient requires assessment of his surgical wound and also his J tube and chest tube sites.

CWN 6BCD-NICU

Baby Girl C was born at 24 weeks and is now corrected to 37 weeks gestation. Her birth weight was 1 Lb 4 oz and is now 5 lbs 2 ozs.

Current medical problems include chronic lung disease- she is on high flow O2 via nasal cannula, tachypnea, apnea and bradycardia. She has a grade IV intraventricular hemorrhage and is status post a bowel perforation with a penrose drain in place. She has bilateral inguinal hernias with mesenteric tissue involvement, retinopathy of prematurity status post Avitine injection into the retina to decrease overgrowth of eye vessels and is experiencing low levicarnitine levels. She is a poor feeder, she chokes when eating and requires pacing of feeds and continuous assessment during feeding and is being followed by the Speech and Swallow service. She is also requiring milk supplementation with calories and Step 2 protein. She is receiving physical therapy 3 times a week. From a psychosocial standpoint she has young parents, her mother was attacked on her way to visit the hospital and is experiencing anxiety, she is seen by psychiatry.

Quadramed Indicator Documentation

ADL-Self/Minimal Care	
ADL-Partial Care	
ADL-Complete Care	X
ADL-Rehabilitative	X
ADL Assistance-2-3 Caregivers	
ADL Assistance-4 or more Caregivers	
Communication Support	

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Cognitive Support	
Behavior/Emotional Management	X
Behavior/Emotional MGT-q 1 Hour	
Safety Management- q 2 Hours	X
Safety Management - q 30 Minutes	
Isolation Precautions (Transmission-Based)	
Physiological Assessment- q 4 Hours	
Physiological Assessment- q 2 Hours	
Physiological Assessment- q 1 Hours	X
Physiological Assessment- q 30 Minutes	
Medication Prep >= 20 Minutes	X
Wound/Injury Management	X
Wound/Injury Mgmt >= 30 Minutes	
Healthcare Mgmt Education >= 1 Hour	X
1 to 1 Physiological Interv. >= 2 Hours	

Explanation of indicators:

- **ADL – Complete Care:** Neonates are completely dependent on staff for all ADL needs.

- **Rehabilitative:** The patent requires extensive oversight and care planning with all feeds and is receiving rehabilitative services from both the Speech and Swallow service and Physical Therapy to maximize her growth and development potential.

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- **Behavior & Emotional Management:** The patient's mother is 18 years old, was recently attacked and has high levels of anxiety for which she is being followed by psychiatry, she requires emotional support in caring for and handling her baby.

- **Safety Management q2 Hours:** The patient has a feeding tube and is dependent on Hi flow O2 via nasal cannula, she is active and at risk for dislodging both pieces of equipment and therefore requires additional safety monitoring.

- **Physiological Assessment:** Vital signs are assessed and documented every hour.

- **Medication Preparation > 20 Minutes:** Due to the need for protein supplementation, her feedings require >20 minutes to prepare.

- **Wound/Injury Management:** She requires assessment and dressing changes to her surgical abdominal wound and penrose drain as well as increased monitoring for extension of her cranial hemorrhage.

- **Healthcare Management Education >=1Hour:** Ongoing teaching with her parents including discharge teaching, medication teaching and P.T. exercises.

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Clinical Indicators

Indicator Name	Seq	09Dec 13:36
ADL - Self/Minimal Care	1	☐
ADL - Partial Care	2	☐
ADL - Complete Care	3	☐
ADL - Rehabilitative	4	☐
ADL Assistance - 2-3 Caregivers	5	☐
ADL Assistance - 4 or more Caregivers	6	☐
Communication Support	7	☐
Cognitive Support	8	☐
Behavior/Emotional Management	9	☐
Behavior/Emotional Mgmt - q 1 Hour	10	☐
Safety Management - q 2 Hours	11	☐
Safety Management - q 30 Minutes	12	☐
Isolation Precautions (Transmission-Based)	13	☐
Physiological Assessment - q 4 Hours	14	☐
Physiological Assessment - q 2 Hours	15	☐
Physiological Assessment - q 1 Hour	16	☐
Physiological Assessment - q 30 Minutes	17	☐
Medication Preparation >= 20 Minutes	18	☐
Wound/Injury Management	19	☐
Wound/Injury Mgmt >= 30 Minutes	20	☐
Healthcare Mgmt Education >= 1 Hour	21	☐
1 to 1 Physiological Interv. >= 2 Hours	22	☐

Indicators of Staff Nurse Workload: Patient and family communication skills and cultural/linguistic characteristics

Indicators of Staff Nurse Workload: Cognitive/functional ability

Indicators of Staff Nurse Workload: Family and other support for patient

Indicators of Staff Nurse Workload: Cognitive/functional ability

Clinical Indicators of Patient Stability: Physiological status and therapeutic supports

Clinical Indicators of Patient Stability: Medications

Clinical Indicators of Patient Stability: Therapeutic supports

Indicators of Staff Nurse Workload: Need for patient and family education and Transitional care & discharge planning required for patient

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Indicator Definitions

Select one of indicators 1 – 3. Selection of one ADL indicator is required.

1. ADL – Self/Minimal Care– Select for a patient who independently performs activities of daily living (feeding, bathing, toileting, mobility, and dressing) or needs minimal assistance to manage the environment and/or medical/therapeutic devices.

2. ADL – Partial Care– Select for a patient who requires assistance in performing any activities of daily living.

3. ADL – Complete Care– Select for a patient who is dependent on staff for activities of daily living.

4. ADL – Rehabilitative– Select for a patient who requires assessment and intervention to restore / achieve the highest level of ADL attainable. Staff is working with the patient in a cognitive manner, helping the patient achieve a higher level of independence.

Select only one of indicators 5 – 6, if applicable.

5. ADL Assistance – 2-3 Caregivers– Select for a patient who requires **two (2) or three (3)** caregivers to complete any activity of daily living.

6. ADL Assistance – 4 or more Caregivers– Select for a patient who requires **four (4) or more** caregivers to complete any activity of daily living.

7. Communication Support– Select for a patient who requires additional care due to uncompensated vision, hearing, speech deficits, language barriers or limitations related to literacy. May apply if the additional care is provided to the patient's family or significant other.

8. Cognitive Support– Select for a patient who, due to temporary or permanent limitations or alterations in cognitive functioning, requires an assessment and intervention to orient to person, place, time, or situation.

Select only one of indicators 9–10, if applicable.

9. Behavior/Emotional Management – Select for a patient who requires intervention to manage behavior or emotions to maintain/regain the ability to participate in the plan of care. May apply if the intervention is provided to the patient's family or significant other.

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10. Behavior/Emotional Management - q 1 Hour– Select for a patient who requires intervention to manage behavior or emotions to maintain/regain the ability to participate in the plan of care every **one hour or more** often for the majority of the classification period. May apply if the intervention is provided to the patient's family or significant other.

Select only one of indicators 11–12, if applicable.

11. Safety Management - q 2 Hours – Select for a patient who, due to risk to harm self or others, requires observation and/or intervention by a staff member every **two (2) hours or more** often for the majority of the classification period.

12. Safety Management - q 30 Minutes– Select for a patient who, due to risk to harm self or others, requires observation and/or intervention by a staff member every **thirty (30) minutes or more** often for the majority of the classification period.

13. Isolation Precautions (Transmission-Based)– Select for a patient who, due to known or suspected risk for transmissible infection or susceptibility to transmissible infection, requires additional precautions beyond Standard Precautions. This includes Airborne, Droplet, and/or Contact Precautions.

Select only one of indicators 14–17, if applicable.

14. Assessment - q 4 Hours– Select for a patient who requires physiological assessment and/or intervention every **four (4) hours or more** often for the majority of the classification period.

15. Assessment - q 2 Hours– Select for a patient who requires physiological assessment and/or intervention every **two (2) hours or more** often for the majority of the classification period.

16. Assessment - q 1 Hour– Select for a patient who requires physiological assessment and/or intervention every **one (1) hour or more** often for the majority of the classification period.

17. Assessment - q 30 Minutes– Select for a patient who requires physiological assessment and/or intervention every **thirty (30) minutes or more** often for the majority of the classification period.

18. Medication Preparation ≥ 20 Minutes– Select for a patient who requires preparation of medication(s) or preparation to administer medication(s) requiring **twenty (20) minutes or greater** of continuous staff time.

Select only one of items 19–20, if applicable.

19. Wound/Injury Management– Select for a patient who requires an assessment and/or intervention of a wound/injury site.

20. Wound/Injury Management ≥ 30 Minutes– Select for a patient who requires continuous wound/injury site intervention for **thirty (30) minutes or greater**.

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21. Healthcare Management Education ≥ 1 Hour– Select for a patient who requires individualized education of **one (1) hour or greater** cumulative duration to address the knowledge and/or procedures that will be necessary for post-discharge healthcare management. A current plan with objectives for teaching/learning exists, and the patient is able to understand and respond to the education. May apply to the patient's family, caregiver, or significant other.

22. 1 to 1 Physiological Intervention ≥ 2 Hours– Select for a patient who, due to physiological instability, requires continuous 1:1 or greater (e.g., 2:1) RN assessment and/or intervention at the bedside for **two (2) hours or greater**.

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EXHIBIT B

1 Hr+ Activity Indicators

1 Hr+	Seq	09Dec 13:38
1:1 safety observation by non-RN	1	☐
Off unit accompanied by RN	2	☐
Off unit accompanied by non-RN	3	☐
Patient/family education by RN	4	☐
Extensive wound management by RN	5	☐
Extensive wound management by non-RN	6	☐
Coordination of care by RN	7	☐
1:1 by RN at the bedside	8	☐
2:1 by RN at the bedside	9	☐

Indicators of Staff Nurse Workload: Need for patient and family education

Indicators of Staff Nurse Workload: Need for care coordination and Transitional care & discharge planning required for patient

Clinical Indicators of Patient Stability: Related Scheduled Procedures

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1+ Hour Activity Indicator Definitions

1. 1:1 safety observation non-RN

Select for a patient who, *due to risk to harm self or others*, requires one-to-one continuous **non-RN** observation.

2. Off unit accompanied by RN

Select for a patient who requires dedicated one-to-one **RN** caregiver to accompany the patient off unit for one (1) hour or greater. Not applicable for a patient who requires 1 to 1 RN care.

3. Off unit accompanied by non-RN

Select for a patient who requires a dedicated one-to-one **non-RN** caregiver to accompany the patient off unit for one (1) hour or greater.

4. Patient/family education by RN

Select for a patient who requires individualized education of one (1) hour or greater continuous duration to address the knowledge and/or procedures that will be necessary for post-discharge healthcare management. A current plan with objectives for teaching/learning exists, and the patient is able to understand and respond to the education. May apply to the patient's family, caregiver, or significant other.

5. Extensive wound management by RN

Select for a patient who requires continuous wound/injury site intervention by an **RN** for one (1) hour or greater.

6. Extensive wound management by non-RN

Select for a patient who requires continuous wound/injury site intervention by a **non-RN** for one (1) hour or greater.

7. Coordination of care by RN

Select for a patient who requires continuous intervention of one (1) hour or greater by an **RN** for coordination of services, such as: patient placement, transfer to another facility, home care arrangements, EMTALA transfers, or multiple medical, surgical, psychiatric and/or other specialty consults to facilitate a coordinated approach to care.

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8. 1:1 by RN

Select for a patient undergoing a bedside procedure who requires dedicated one-to-one care by an RN for one (1) hour or greater. Not applicable for a patient who requires 1 to 1 RN care.

9. 2:1 by RN

Select for a patient undergoing a bedside procedure who requires dedicated two-to-one care by RNs for 1 hour or greater.

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EXHIBIT C

Patient Classification Screen as Viewed by Staff RN

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Exhibit C (continued)

Window Used by Staff RN to Classify Patient

Unit	Methodology	Type	Treatment Area	Classified	Time In	Time Out	Classified By
OTHER (BWH)	Inpatient	0	Medical Oncology	1/19/2016 1:26:04 PM			DONNELLY, SH
OTHER (BWH)	Inpatient	4	Ready for Tx	1/15/2016 10:24:54 AM			DONNELLY, SH

Inpatient

Indicator Name	Seq	19Jan 08:08	19Jan 01:00	18Jan 14:46
ADL - Self/Minimal Care	1	☐	☐	☐
ADL - Partial Care	2	☐	☐	☐
ADL - Complete Care	3	☑	☑	☑
ADL - Rehabilitative	4	☐	☐	☐
ADL Assistance - 2-3 Caregivers	5	☑	☑	☑
ADL Assistance - 4 or more Caregivers	6	☐	☐	☐
Communication Support	7	☑	☑	☑
Cognitive Support	8	☑	☑	☑
Behavior/Emotional Management	9	☐	☑	☐
Behavior/Emotional Mgmt - q 1 Hour	10	☐	☐	☐
Safety Management - q 2 Hours	11	☑	☑	☑
Safety Management - q 30 Minutes	12	☐	☐	☐
Isolation Precautions (Transmission-Based)	13	☐	☐	☐
Physiological Assessment - q 4 Hours	14	☐	☐	☐
Physiological Assessment - q 2 Hours	15	☐	☐	
Physiological Assessment - q 1 Hour	16	☑		☑
Physiological Assessment - q 30 Minutes	17		☐	☐
Select for a patient who requires physiological assessment and/or intervention every thirty (30) minutes or more often for the majority of the classification period.	18	☐	☐	☐
	19	☑	☑	☑
	20	☐	☐	☐
	21	☐	☐	☐
1 to 1 Physiological Interv. >= 2 Hours	22	☐	☐	☐

To see the definition of an indicator while classifying a patient the RN can hold the mouse pointer over the indicator name and the definition appears.

Example for Indicator #17: Physiological Assessment – q 30 minutes

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Exhibit D

Patient Types and Correlating Hours of Care Needs

Patient Types and Hours of Nursing Care						
Patient Type	1	2	3	4	5	6
Acuity	0.7	1.0	1.5	2.3	3.1	4.6
Range of Direct Care Hours/24hrs	0-4	4-7	7-10	10-14	14-20	20+

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Patient Types and the associated range of direct care nursing hours are applied to a unit's budgeted skill mix and Target Hours Per Workload Index. Patient assignments will always be determined by the professional clinical judgment of the nursing care team and will depend on the individual RN and associated non-RN care needs of the patients together with the skill level of the Registered Nurse as well as unit characteristics. Using the Quadramed AcuityPlus methodology for an ICU patient, the model suggests considering that a Type 6 patient would be a one RN to one patient assignment, or, a two RN to one patient assignment at specified times, for example, for the first 4 hours post operatively for a stable lung transplant patient. Per regulatory guidelines, for all other type patients in an ICU setting the assignment would be one RN to one patient or one RN to two patients, dependent again on the professional assessment and judgment of the nursing care team about the type of nursing care needs the patient requires (i.e. RN or Non-RN direct care). Data is to be utilized as a decision support tool for the nursing care team in this process of determining the safest and most appropriate assignment for the patient and nurse.

Direct nursing care hours are derived by applying the unit's skill mix to the range of direct care hours recommended by Quadramed for the given patient type as determined by the nurse's classification.

FY 16 Budgeted Skill Mix-ICU's	RN's
SH9	88%
SH6	87%
3BC	88%
9CD	87%
8CD	87%
11C	88%

Using this methodology, our Actual RN-to-Patient ratios for the past 6 quarters are as follows:

Avg. Pts/RN	Q1 FY15	Q2 FY15	Q3 FY15	Q4 FY15	Q1 FY16	Q2 FY16
Sh9 - Cardiac ICU	0.97	1.23	1.23	1.24	1.21	1.23
Sh6 - Cardiac Surgery ICU	1.08	1.04	1.00	1.09	1.09	1.13

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3BC - Medical ICU	1.20	1.17	1.11	1.11	1.11	1.12
8CD - Surgical/Burn-Trauma ICU	1.11	1.07	1.02	1.10	1.06	1.08
9CD - Neuro/Neurosurgical ICU	1.20	1.18	1.08	1.18	1.18	1.12
11C - Thoracic ICU	1.11	1.09	1.00	1.10	1.10	1.09

Patient Types and Calculating Direct Care Hours

Patient types are determined by dividing the patient population into the maximum differentiable categories based on patients' needs for care. Patient type categories are statistically differentiated by both care requirements and indicator utilization. The primary analysis tools are cluster analysis and factor analysis. For the Inpatient Methodology, six patient types are defined.

Acuity Values

Acuity values or relative value units (RVUs) are determined based upon patient care hour requirements using the Type II patient as the base value (Acuity=RVU=1=1 unit of workload/24 hours). Acuity values of the other patient types are determined relative to the Type II patient by comparing mean care hour requirements of each type. With the Inpatient methodology, the Type I patient has an acuity value of 0.7 which means Type I patients typically require 0.7 or 70% of the care hour requirements of Type II patients. Subsequent care requirement multipliers for the Type III, IV, V and VI patients are 1.5, 2.3, 3.1 and 4.6.

Patient Type Range of Direct Care Hours

Ranges of direct care hours per 24/hours are specified recognizing that every unit may not require the same target hours per unit of workload. Direct Care Hours includes all direct care nursing personnel (Registered Nurses and unlicensed direct care personnel). In the Quadramed research, care hour requirements at the 10th and 90th percentile were used to specify hour ranges within a patient type. To determine the recommended hours of care for a patient, a Target Hour Per Workload Index (THPWI) is established at the unit level. This

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value describes the number of staffing hours per unit of workload. The determination of the THPWI incorporates multiple factors, in addition to the patient's needs for care. These include, although are not limited to:

- Patient Population Information; such as clinical service, length of stay, physician care practices
- Unit Information; such as number of beds, average occupancy, geographical layout, bed allocation
- Staff Information; such as experience level, skill mix, minimum staffing requirements, care delivery methods, support personnel (clerical, transporters, housekeeping), professional support (respiratory therapy, physical therapy)

For illustrative purposes, we have included the below example of how acuity and patient type are used to calculate the range of direct care hours.

THPWI: 6.0 hours of care per unit of workload

Mr. M. classifies as a Type 4 patient, a patient requiring between 10 and 14 hours of care in 24 hours. A Type 4 patient is equivalent to 2.3 units of workload. The total hours of recommended care for Mr. M are 13.8 (6.0 x 2.3). The distribution of care for an ICU patient is the same across the 24 hour period, thus 50% of the care is provided on the 7 AM shift and 50% of the care on the 7 PM shift. This equates to 6.9 hours of care per 12-hr shift. 85% of the care hours are allocated to the RN (based on a skill mix of 85% RN, 15% Non-RN direct nursing care), or 5.87 hours of care per 12-hr shift.

EXHIBIT E

AcuityPlus Inpatient Methodology Development Summary

Overview

QuadraMed Corporation provides a valid and reliable inpatient methodology to differentiate patients based on their needs for care. The AcuityPlus Inpatient methodology is the latest generation of the inpatient methodology that was originally developed in 1975. All Partners facilities utilize the electronic version of QuadraMed. QuadraMed maintains the validity, transportability and reliability of the methodology using an evidence-based approach to the development process.   Due to constant changes in health care delivery such as new technologies, increasing patient acuity and compression of patient length of stay; QuadraMed is committed to revalidating and updating the Inpatient patient classification methodology every 5 to 7 years.

The development process of the AcuityPlus Inpatient patient classification methodology spanned two years, involving over thirty client institutions and the evaluation of over 8,600 patient workload classifications covering a wide variety of clinical specialties. The result of the project was the release of the AcuityPlus Inpatient Methodology. The project included four main phases. Each phase is outlined below.

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Background Research

A literature search was completed to review the trend in workload measurement and patient care delivery. Additional information was gathered via client focus groups.

Pre-Testing

A review of the validity and reliability of the current methodology were identified, data collection methods and approaches were determined and tested, and clinical sites for data collection were identified. Client questionnaires were developed and distributed to assess the effectiveness of the current inpatient methodology. Thirty-three clients completed questionnaires providing scope and focus for the project. Data collection methods, test patient care indicators and data collection sites were determined. Extensive pre-testing of the indicators and data collection protocols was completed by the QuadraMed consultants; this included over 2,000 patient days of data on 52 patient care units. Initial testing to determine the RN component of care was initiated. Data collection methods and patient care indicators were refined for further testing.

Alpha Testing

Alpha testing activities included testing of the proposed sets of indicators against clinical populations in client sites to determine the best set of indicators that could discriminate levels of patient care needs, and formulate a methodology for validity and reliability testing. Client clinical experts collected data at 19 sites, involving 86 patient care units and evaluation of nearly 3,500 patients. Data collection consisted of patient evaluation, RN specific patient care requirements (complexity of care measurement) and application of the test indicators. At the conclusion of Alpha Testing, a predictive set of indicators was refined and the Inpatient methodology was formulated for validation testing.

Beta Testing

During beta testing, the utility of the patient care indicators was determined and the validity, reliability, and transportability of the methodology was established; in addition to the development and testing of a procedural component of the methodology to assess ADT (patient admission, discharge, transfer) and procedural workload. Beta testing took place in three stages, with indicator and

methodology refinement occurring after each stage of data collection. Clinical experts collected over 2,000 patient days of data on 109 units and fourteen client sites.

The institutions that participated in the research process included academic medical centers, teaching hospitals, and community hospitals; the average daily census in the participating facilities ranged from a volume of 100 to over 1,000 patients; and the locations of the institutions included sites across the United States and 2 Canadian organizations.   Massachusetts General Hospital was one of the sites that participated in the study.

Results

The AcuityPlus Inpatient Methodology includes:
- changes in the patient care indicators, patient type point ranges and patient type weights;
- activity classification component to capture patient workload related to admission, transfer, and discharge activities
- activity classification to capture workload associated with bedside procedures, extended teaching, safety and off unit activities that are 1 hour or longer in length
- Complexity of Care measure to provide a relative measure of the RN care needs of the patient.

In testing, the validity improved at the overall level and over the majority of clinical specialties. Extensive client feedback indicates that the methodology revisions provide greater face validity to staff nurses.

Validity

The validation of the AcuityPlus Inpatient Methodology included analysis of content validity, face validity, criterion-related validity, predictive validity and construct validity (transportability). Clinical Nurse Experts were used extensively in the development and testing of the methodology. The methodology was tested against several other measures of patient care including similar methodologies, patient work sampling and clinical expert estimates of patient care hour requirements. Transportability was insured through validation in various institution sizes, types, locations, and over various clinical specialties. The conceptual approach of basing workload on patient needs allows for standardized measurement of patient workload regardless of location. For example, if a critical post-operative patient is admitted to a Medical ICU or a Surgical ICU or a mixed population ICU, the patient's needs for care are the same. The patient would fall into the same category or type, regardless of the patients' geographical location. This process is supported by educating staff on the appropriate application of the indicators in the various unit settings. Thus, one acuity system can be used to determine the patient's needs for care in all ICU units. [Refers to "Acuity tool tailored to unique care needs and circumstances of the patient population in the ICU."]
The patient's age is captured in the software via the interface to the electronic admission, discharge and transfer system; the gestational age of neonates is not explicitly captured though it is required knowledge for the assigned care team. From the QuadraMed research, age has not proven to be a consistent differentiator of patient needs. For example, Infant A, 32 weeks gestation may have pulmonary issues

requiring ventilator support where Infant B, 32 weeks gestation also has pulmonary issues, yet doesn't require ventilator support. Additionally, the infants may respond to treatment differently. [Refers to "Indicators of Staff Nurse Workload: Patient age, including gestational age as applicable."]

Validation in ICU Units

The AcuityPlus Inpatient methodology was tested extensively in the ICU population. Multiple ICU units participated in the validation study including CCU, Medical ICU, Surgical ICU, Medical/Surgical ICU, Cardiovascular ICU, Neuro ICU, Trauma ICU, Burn ICU, Pediatric ICU and Neonatal ICU.

Clinical Indicators

During the research process to determine the clinical indicators that differentiate patients, indicators for multiple clinical systems were tested. This included system such as pulmonary, cardiovascular, neurological, and fluid management. The analysis of data revealed that selection of various assessment indicators were highly correlated with each other. Thus separate indicators for each system did not provide additional information to differentiate patients based on their need for care; the frequency of assessments was the differentiating factor.

Inpatient Methodology

The Inpatient methodology is comprised of three components: 1) clinical indicators (see Exhibit A for list of clinical indicators), 2) patient turnover, and 3) activities requiring additional 1:1 care for one hour or greater duration (see Exhibit B for list of 1 Hour+ activities). The clinical indicators account for the variance in the patient's needs for care and are allocated on weight based on the indicators' correlation to predicting care needs. The total points of the indicators applicable to each patient determine the category or patient type. The patient turnover component captures the relative care needs related directly to the admission, transfer and discharge process of patient care. Patient activities that require 1:1 or greater staff to patient ratio for one hour or longer include both bedside procedures and events and instances where the RN needs to stay with a patient to meet their care needs when an off-unit procedure or activity is performed.

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In addition to the methodology components, the system implementation process incorporates a determination of other factors that impact the units staffing needs. This includes factors such as: geographical layout of the unit, number of beds, unit support systems, and experience of the staff in caring for the specific clinical population.

Methodology Reliability

The use of straight-forward clinical indicators that measure patient needs facilitates the reliability of the methodology. Reliability testing guidelines are provided and the system automates reliability testing and scoring.

Complexity of Care is a measurement captured by the patient classification process. The Complexity of Care Measure provides a measure of the patient's needs for professional RN care within the required hours of care. This information may be used in the patient assignment process, facilitating the assigning of the most experienced and skilled staff to the patient's with the highest complexity of care measure. [Refers to "Clinical Indicators of Patient Stability: Clinical complexity."]

December, 2015