

Intensive Care Unit: Acuity Tool Certification

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Name of Proposed Acuity Tool:	<i>QuadraMed AcuityPlus</i>
Acuity Tool Format:	<i>Electronic</i>
Intensive Care Units in which the acuity tool will be deployed:	Blake 8 - Cardiac Surgical ICU Ellison 9 - Cardiac Care Unit Lunder 6 - Neuro ICU Blake 7 - Medical ICU Bigelow 6 - Pediatric ICU Ellison 4 - Surgical ICU Blake 12 - Surgical ICU Ellison 14 - Burn ICU Blake 10 – 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 ICU, Burn ICU, Pediatric ICU and Neonatal ICU. 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.

Please also see Exhibit E, "AcuityPlus Inpatient Methodology Development Summary" for summary of AcuityPlus Methodology

II. Methodology for Scoring Acuity

The Staff Nurse assigned to the patient selects the relevant clinical indicators for the patient within the electronic AcuityPlus application (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.

For many years, MGH Staff Nurses have been classifying their patients once a day and upon admission to the unit via the QuadraMed Acuity tool. Classifying patients in greater frequency adds workload to the staff nurse and requires additional training be conducted in order to ensure acuity tool reliability. The requirement to classify once per shift defeats any effort to increase the hours of direct care a nurse provides to patients. As such, MGH administration has been sensitive to increase the workload of these nurses and will reluctantly plan on moving to a once-a-shift classification process by July 2016.

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 staff nurse who classifies the patient.
X	Physiological status	
X	Clinical complexity*	
X	Related scheduled procedures	

The QuadraMed AcuityPlus patient classification process is a composite of all clinical

X	Medications and therapeutic supports	<p>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.</p> <p>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.</p>
Indicators of Staff Nurse Workload		
<input type="checkbox"/>	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.

Blake 8 - Cardiac Surgical ICU

Patient is a 32 year-old male with a history of heart failure and liver failure admitted to CSICU status post (s/p) orthotopic heart transplant. His operating room (OR) course was complicated by bleeding and failure to wean from cardiopulmonary bypass (CPB) which required initiation of veno-arterial Extracorporeal Membrane Oxygenation (VA ECMO) support. On this day of classification, patient is requiring 2:1 RN to patient care at times along with ECMO trained respiratory therapist at the bedside. Patient remains intubated, chemically paralyzed, and sedated. Continuous Venovenous Hemofiltration (CVVH) has been started. Bleeding continues and patient requiring fluid resuscitation and administration of 50+ blood products (PRBC, platelets, FFP, and cryoprecipitate). In addition to continuous titration of multiple vasoactive and inotrope drips, patient is receiving anti-rejection medications, which require special preparation, handling, and administration. Wound management includes caring for the open chest and abdomen as well as frequent dressing changes for the oozing cannula sites. For repositioning, 4 or more people are needed.

His family is very supportive and has been at hospital all day; the family is primarily Spanish speaking and translators and use of Interpreter Phone on a Pole (IPOP) device are needed to communicate with them; they are requiring frequent interventions to help them cope with anxiety related to complex care requirements.

QuadraMed Indicator Documentation Sheet

Indicator Name	Indicator Selection	Rational for Selection
ADL-Self/Minimal Care		
ADL-Partial Care		
ADL-Complete Care	X	Patient is unable to perform any of his ADLs.
ADL-Rehabilitative		
ADL Assistance-2-3 Caregivers		
ADL Assistance-4 or more Caregivers	X	Requires 4 or more staff to complete mobility and bathing ADLs to ensure safety of patient and maintain integrity of invasive catheters.
Communication Support	X	Due to language barrier, family requires translators and use of IPOP device in order to explain patient condition, treatment interventions and answer questions/concerns.
Cognitive Support		
Behavior/Emotional Management	X	Due to complexity of patient condition and treatment plan family is very anxious and requires interventions by RNs to help them cope with all that is happening.
Behavior/Emotional Mgmt -q 1 Hour		
Safety Management- q 2 Hours		
Safety Management - q 30 Minutes		
Isolation Precautions (Transmission-Based)	X	Due to increased risk for infections because of anti-rejection medications he is receiving patient requires precautions.
Physiological Assessment- q 4 Hrs		
Physiological Assessment- q 2 Hrs		
Physiological Assessment- q 1 Hr		
Physiological Assessment- q 30 Minutes	X	Vital signs are assessed & documented Q30 minutes and sometimes more frequently; he is on medications that are titrated according to vital signs; fluid intake & output are assessed & documented and replacement fluids are adjusted according to orders for fluid loss; CVVH blood flow rate, arterial & venous pressures are assessed every hour.
Medication Prep >= 20 Minutes	X	Intravenous medications requiring > 20 minutes to prepare and preparation of blood products for administration.
Wound/Injury Management		
Wound/Injury Mgmt >= 30 Minutes	X	Open chest wound dressing requires more than 30 minutes of time.
Healthcare Mgmt Education >= 1 Hr		

1 to 1 Physiological Interv.>= 2 Hrs	X	Patient required 2 RNs continuously for 2.5 hours to establish physiological stability when admitted to the ICU from the OR.
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Ellison 9 - Cardiac Care Unit

Patient is a 56 year old man who was admitted to CCU status post (s/p) pulseless electrical activity (PEA) arrest related to heroin overdose. PMH: Chronic Obstructive Pulmonary disease (COPD) and is active smoker, ETOH abuse, heroin abuse, and malnutrition.

Brief review of 3 week hospitalization: he successfully was cooled/re-warmed 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 Sheet

Indicator Name	Indicator Selection	Rational for Selection
ADL-Self/Minimal Care		
ADL-Partial Care		
ADL-Complete Care	X	Patient 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		
ADL Assistance -2-3 Caregivers	X	Requires 2-3 staff to complete mobility and bathing ADLs, cannot be accomplished with single provider.
ADL Assistance- 4 or more Caregivers		
Communication Support	X	Due to his tracheostomy he is unable to verbalize his needs or answer questions. He communicates through nodding his head in response to questions; at times he is able to gesture his needs.
Cognitive Support	X	He has suffered anoxia related to his arrest and needs frequent reorientation and behavioral redirection.
Behavior/Emotional Management		
Behavior/Emotional Mgmt -q 1 Hour	X	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- q 2 Hours	X	He requires bilateral soft wrist restraints due to his impulsivity and risk for detachment from ventilator.
Safety Management - q 30 Minutes		

Isolation Precautions (Transmission-Based)		
Assessment- q 4 Hours		
Assessment- q 2 Hours		
Assessment- q 1 Hours	X	Vital signs are assessed & documented Q1H. He is on medications that are titrated accordingly, at times also Q1H.
Assessment- q 30 Minutes		
Medication Prep >= 20 Minutes	X	Multiple medications are crushed and administered via dohoff tube throughout the day. He also required a blood transfusion.
Wound/Injury Management	X	The diffuse open and weeping areas of skin require ointment application; his tracheostomy site needs to be cleaned regularly and the skin around trach tracheostomy protected.
Wound/Injury Mgmt >= 30 Minutes		
Healthcare Mgmt Education >= 1Hr	X	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.
1 to 1 Physiological Interv.>= 2 Hrs		

Lunder 6 - Neuro ICU

Patient is a 57 year old male found seizing. His medical history includes hypertension (HTN). On day of admission a computed tomography (CT) and a computed tomography angiography (CTA) showed a subarachnoid hemorrhage and ruptured anterior communicating artery aneurysm. The patient's aneurysm was clipped in the operating room (OR), and an external ventricular drain (EVD) was placed along with other invasive neuro-monitoring. He has had several CTs and will have a magnetic resonance imaging test (MRI) of his neck and brain.

He will be in the Lunder 6 Neuro ICU for at least two weeks for vasospasm watch with daily transcranial doppler (TCD) studies done. He is intubated and ventilated and is "lifted" off sedation every 1-2 hours for a full neurological exam. Patient is on electroencephalogram (EEG) monitoring, has central line and arterial line. May require angiogram for vasospasm treatment. Family and friends visit frequently and RN provides ongoing family updates.

QuadraMed Indicator Documentation Sheet

Indicator Name	Indicator Selection	Rational for Selection
ADL-Self/Minimal Care		
ADL-Partial Care		
ADL-Complete Care	X	Patient is unable to perform any of his ADLs; completely dependent on staff for all care.
ADL-Rehabilitative		

ADL Assistance -2-3 Caregivers	X	Requires 2-3 staff to complete mobility and bathing ADLs; cannot be accomplished with single provider.
ADL Assistance- 4 or more Caregivers		
Communication Support	X	When sedation is lifted: he is unable to verbalize his needs or answer questions due to nasotracheal tube. He attempts to communicate by nodding his head in response to questions.
Cognitive Support	X	When sedation is lifted: he is restless and tries to sit-up; therefore, requires frequent reorientation and behavioral redirection.
Behavior/Emotional Management	X	When sedation is lifted: he is visibly upset and requires comforting and explanations related to care needs from RN.
Behavior/Emotional Mgmt -q 1 Hour		
Safety Management- q 2 Hours	X	When sedation is lifted: he requires visual observations due to his impulsivity and risk for pulling at catheters and nasotracheal tube.
Safety Management - q 30 Minutes		
Isolation Precautions (Transmission-Based)		
Assessment- q 4 Hours		
Assessment- q 2 Hours		
Assessment- q 1 Hours	X	Vital signs and urine output are assessed & documented Q1H. He is on medications that are titrated accordingly.
Assessment- q 30 Minutes		
Medication Prep >= 20 Minutes		
Wound/Injury Management	X	Assessment and care of surgical wound site; invasive catheter dressing changes.
Wound/Injury Mgmt >= 30 Minutes		
Healthcare Mgmt Education >=1 Hr		
1 to 1 Physiological Interv.>= 2 Hrs		

Blake 7 - Medical ICU

Patient is a 42 year old female admitted to MICU from out-of-state hospital for lung biopsy, worsening respiratory distress. Past medical history includes childhood asthma; multidrug-resistant organisms (MDRO +).

Patient had pneumomediastinum. Once in MICU required extracorporeal membrane oxygenation consult. She went to the operating room (OR) for cannulation. In the OR she was intubated along with insertion of veno-venous Extracorporeal Membrane Oxygenation (VV ECMO) cannulas; issues with size of patient and cannula were encountered requiring tension suture placement; in addition, she required chest tube (CT) placement.

Hospital course: this is hospital day #25. Patient has been on VV ECMO for 24 days; she has a tracheostomy; has undergone video-assisted thoracoscopic surgery (VATS); had a hydropneumothorax; has required multiple transfusions; is on / off vasopressors; now with 4 CTs --- prior to 4th CT placement had massive bleeding into right lung requiring OR wash outs and blood transfusions; has marginal Heparin-induced thrombocytopenia (HIT) requiring argatroban. Now not anticoagulated via circuit. Sedation issues include prece dex, propofol, dilaudid, seraque, methadone, attempted phenobarbital but since discontinued. When awake patient is hypertensive, tachycardic and has respiratory dysynchrony. Basic care including turning requires 4 people including respiratory therapist. There are multiple social issues: language barrier as mother is non-English speaking but refuses to use Interpreter Phone on a Pole (IPOP) device; limit setting with friends is ongoing; fiancé is out of country at moment; four children are living with ex-husband. Goal is to wake patient enough to discuss transplant options, if she wishes.

QuadraMed Indicator Documentation Sheet

Indicator Name	Indicator Selection	Rational for Selection
ADL-Self/Minimal Care		
ADL-Partial Care		
ADL-Complete Care	X	Patient is unable to perform any of her ADLs. Today patient is not responsive due to sedation required to maintain respiratory stability.
ADL-Rehabilitative		
ADL Assistance-2-3 Caregivers		
ADL Assistance-4 or more Caregivers	X	Requires 4 or more staff to complete mobility and bathing ADLs to ensure safety of patient and maintain integrity of invasive catheters.
Communication Support	X	Due to language barrier, family requires translators in order to explain patient condition, treatment interventions and answer questions/concerns.
Cognitive Support		
Behavior/Emotional Management		
Behavior/Emotional Mgmt -q 1 Hour	X	Family requires frequent interventions by RN to help them cope with complexity of situation; friends requiring extensive reinforcement by RN of limit setting guidelines related to visiting to ensure adequate rest / quiet for patient – ongoing issue.
Safety Management- q 2 Hours		
Safety Management - q 30 Minutes		
Isolation Precautions (Transmission-Based)		
Physiological Assessment- q 4 Hrs		
Physiological Assessment- q 2 Hrs		
Physiological Assessment- q 1 Hr	X	Vital signs are assessed & documented Q hour; sometimes more frequently; she is on medications that are titrated accordingly; she requires hourly assessment of her response to sedation; hourly assessment of fluid balance.
Physiological Assessment- q 30		

Minutes		
Medication Prep >= 20 Minutes	X	Intravenous medications requiring > 20 minutes to prepare and preparation of blood products for administration.
Wound/Injury Management	X	Chest tube and invasive line dressing changes.
Wound/Injury Mgmt >= 30 Minutes		
Healthcare Mgmt Education >= 1 Hr		
1 to 1 Physiological Interv.>= 2 Hrs		

Bigelow 6 - Pediatric ICU

Patient is an 8 year old female. Four days prior to admission she developed a fever to 101 accompanied by decreased oral intake; her sister has been sick. Two days prior she developed neck pain, headache, and odynophagia and was seen by her pediatrician where a rapid strep was positive and she was started on amoxicillin. Day of admission she developed a rash and hives. Because of the rash, a worsening headache and neck pain her parents brought her to an outside hospital Emergency Department; there a neck computed tomography (CT) which revealed a 13mm retropharyngeal abscess with major vessel compression. The patient was then transferred to MGH and admitted to the Pediatric ICU for further treatment and observation due to concern for airway obstruction and swelling.

Today is day after admission and she continues on ceftriaxone and clindamycin for strep; pain level is 5 out of 10 on FACES pain scale and treated with Tylenol and morphine; patient experiencing episodes of crying due to pain.

Red rash noted on abdomen, legs and face responding to Benadryl. Receiving intravenous (IV) fluids through a peripheral IV catheter; urine output good. Patient does get out of bed only when accompanied by RN. Mother has remained at hospital with patient and slept in patient's room; mother is very anxious about the possibility that condition will worsen and asking frequent questions about plan of care.

QuadraMed Indicator Documentation Sheet

Indicator Name	Indicator Selection	Rational for Selection
ADL-Self/Minimal Care		
ADL-Partial Care	X	Patient is able to ambulate to bathroom with assistance of RN; she can participate in other ADL activities when pain level allows.
ADL-Complete Care		
ADL-Rehabilitative		
ADL Assistance-2-3 Caregivers		
ADL Assistance-4 or more Caregivers		
Communication Support		
Cognitive Support		
Behavior/Emotional Management		
Behavior/Emotional Mgmt -q 1 Hour	X	Patient crying due to pain and requires comforting and reassurance from RN.

		Mother extremely anxious, asking questions about plan, she is concerned about possibility of problem reoccurring after discharge. RN providing support hourly during the shift; involving mother in care when appropriate.
Safety Management- q 2 Hours		
Safety Management - q 30 Minutes		
Isolation Precautions (Transmission-Based)	X	Precautions while ruling out flu.
Physiological Assessment- q 4 Hrs		
Physiological Assessment- q 2 Hrs		
Physiological Assessment- q 1 Hr	X	Vital signs are assessed & documented Q hour; assessing for signs of respiratory distress; hourly assessment of patient's response to pain medication.
Physiological Assessment- q 30 Minutes		
Medication Prep >= 20 Minutes		
Wound/Injury Management		
Wound/Injury Mgmt >= 30 Minutes		
Healthcare Mgmt Education >= 1 Hr	X	Education started in preparation for discharge related to antibiotics and pain control if necessary.
1 to 1 Physiological Interv.>= 2 Hrs		

Ellison 4 - Surgical ICU

Patient is 41 year old female admitted from an outside hospital with nausea, vomiting, abdominal pain, fever to 101.4. Computed tomography (CT) revealed extensive subcutaneous air/necrotizing infection in buttocks and perineum.

Past medical history: Alcohol disuse disorder with withdrawal seizures, alcoholic cirrhosis, anxiety, obesity, gastroesophageal reflux disease (GERD).

Hospital day 1-2: Patient went to operating room (OR) on day one and underwent procedure to debride necrotic tissue. Patient intubated, sedated, in septic shock requiring intravenous (IV) drips (levophed and vasopressin) to maintain blood pressure due to septic shock.

Hospital Day 4-5: (today is day 5) Patient returned to OR for further debridement and ostomy to divert stool from wound. Severely hypotensive post-op with significant bleeding and severe sepsis. Periodically throughout shift, requiring multiple RNs at bedside to assist the assigned/primary RN manage care and transfuse blood products with rapid transfuser. Difficulty with respiratory ventilation required patient to be chemically paralyzed, high ventilator settings, blood pressure very labile on multiple IV drips to maintain blood pressure. Going into acute kidney and liver failure. Family present throughout day and at bedside with patient as much as possible.

QuadraMed Indicator Documentation Sheet

Indicator Name	Indicator Selection	Rational for Selection
ADL-Self/Minimal Care		

ADL-Partial Care		
ADL-Complete Care	X	Patient is unable to perform any of his ADLs. Today patient is not responsive due to sedation required to maintain respiratory stability.
ADL-Rehabilitative		
ADL Assistance-2-3 Caregivers		
ADL Assistance-4 or more Caregivers	X	Requires 4 or more staff to complete mobility and bathing ADLs to ensure patient comfort due to extensive disruption of skin integrity.
Communication Support		
Cognitive Support		
Behavior/Emotional Management	X	Family requires frequent interventions by RN to help them cope with complexity of situation; family has many questions requiring extensive interactive discussions outlining care plan and explaining medical interventions that are happening.
Behavior/Emotional Mgmt -q 1 Hour		
Safety Management- q 2 Hours		
Safety Management - q 30 Minutes		
Isolation Precautions (Transmission-Based)	X	Patient is on contact precautions.
Physiological Assessment- q 4 Hrs		
Physiological Assessment- q 2 Hrs		
Physiological Assessment- q 1 Hr		
Physiological Assessment- q 30 Minutes	X	Vital signs are assessed & documented Q 30 minutes; sometimes more frequently as she is on medications that are titrated according to her blood pressure; hourly assessment of fluid status; also requires assessment of his response to sedation.
Medication Prep >= 20 Minutes	X	Intravenous medications requiring > 20 minutes to prepare and preparation of blood products for administration.
Wound/Injury Management	X	Ostomy care and extensive skin and surgical site assessment and interventions related to subcutaneous necrotizing infection.
Wound/Injury Mgmt >= 30 Minutes		
Healthcare Mgmt Education >=1 Hr		
1 to 1 Physiological Interv.>= 2 Hrs	X	Patient required 2 RNs continuously for 3 hours to stabilize blood pressure and administer multiple blood products required this day.

Blake 12 - Surgical ICU

Patient is an 81 year old male who was brought to MGH by ambulance after being struck by a car. Admission evaluation revealed bilateral sacral fractures; multiple left-sided rib fractures and a subdural hematoma. Past medical history unknown at this time.

He was admitted to the Blake 12 ICU where he experienced several episodes of hemodynamic instability requiring intravenous fluids, blood products; a central venous catheter was inserted and vasopressors were started. He was intubated and ventilated for airway

protection. His was sedated due to agitation and has received medication for pain as indicated by grimacing with movement / repositioning. He has several skin abrasions as a result of the accident. His emergency contact does not live in Massachusetts but doctors and RNs have communicated with her; a close friend is present and was able to briefly visit with patient.

QuadraMed Indicator Documentation Sheet

Indicator Name	Indicator Selection	Rational for Selection
ADL-Self/Minimal Care		
ADL-Partial Care		
ADL-Complete Care	X	Patient is unable to perform any of his ADLs.
ADL-Rehabilitative		
ADL Assistance-2-3 Caregivers		
ADL Assistance-4 or more Caregivers	X	Requires 4 or more staff to reposition him to ensure patient safety and comfort due to multiple injuries.
Communication Support	X	He is unable to verbalize his needs / answer questions because of nasotracheal tube. He communicates with staff by nodding and squeezing RNs hand.
Cognitive Support	X	He is restless and tries to sit-up; therefore, he requires frequent reorientation and behavioral redirection.
Behavior/Emotional Management		
Behavior/Emotional Mgmt -q 1 Hour		
Safety Management- q 2 Hours	X	Patient is agitated and restless requiring observation and reorientation / redirection to prevent him from pulling at lines and tube.
Safety Management - q 30 Minutes		
Isolation Precautions (Transmission-Based)		
Physiological Assessment- q 4 Hrs		
Physiological Assessment- q 2 Hrs		
Physiological Assessment- q 1 Hr		
Physiological Assessment- q 30 Minutes	X	Vital signs are assessed & documented Q 30 minutes; he is on medications that are titrated according to his blood pressure; also requires hourly assessment of response to sedation and pain medication.
Medication Prep >= 20 Minutes	X	Intravenous medications requiring > 20 minutes to prepare and preparation of blood products for administration.
Wound/Injury Management	X	Assessment and treatment of multiple skin abrasions.
Wound/Injury Mgmt >= 30 Minutes		
Healthcare Mgmt Education >=1 Hr		
1 to 1 Physiological Interv.>= 2 Hrs	X	Required 2 RNs continuously to stabilize patient upon admission --- treatment of blood pressure, intubation and administration of multiple blood products all

occurring simultaneously.

Ellison 14 - Burn ICU

Patient is a 37 year old male admitted to the Burn Unit after sustaining 95% Total Body Surface Area (TBSA) as a result of a gas can explosion. No known past medical history.

He has gone to the Operating Room (OR) 9 times for excision of burned skin and allografting since admission; a percutaneous tracheostomy tube was inserted during one of his OR events.

He no longer requires ventilator support and is on 21% oxygen via Trach mask for humidification. He is receiving electrolyte repletion via intravenous fluid (IV); and IV fluids are adjusted based on hourly urine output and his total body balance. He has an indwelling urinary catheter; a temporary containment device for management of incontinent liquid stools and an enteroflex feeding tube. Physical therapy and occupational therapy treat him 4 times a week, requiring 2-3 assist.

Wound care is extensive with daily full body dressing changes of kerlix soaked with amphotericinB / sulfamylon solution. Face wound care is done twice a day with bacitracin; and ears / nose with sulfa cream. He is sedated with fentanyl and versed; requiring increased doses and addition of haldol for dressing changes. He is on contact precautions due to Acinetobacter in his sputum and pseudomonas on chest and arms.

Today RN will be preparing/instructing patient and family for a cultured epithelial autograft (CEA) placement tomorrow in OR --- cultures are done, and antibiotic solution is ready for post-operative care.

QuadraMed Indicator Documentation Sheet

Indicator Name	Indicator Selection	Rational for Selection
ADL-Self/Minimal Care		
ADL-Partial Care		
ADL-Complete Care	X	Patient is unable to perform any of his ADLs due to weakness and mobility restriction secondary to his wounds.
ADL-Rehabilitative		
ADL Assistance-2-3 Caregivers		
ADL Assistance-4 or more Caregivers	X	4 staff are required for bathing and mobility ADLs to ensure patient comfort due to burns.
Communication Support	X	Due to his tracheostomy he is unable to verbalize his needs/ answer questions. He communicates with staff and family by nodding and pointing to picture / letter board.
Cognitive Support	X	Patient has episodes of confusion due to the effects of sedation requiring reorientation / redirection.
Behavior/Emotional Management	X	Patient requires RN interventions to redirect him when confused and help him with

		feeling of frustration and anger. Preparing him for CEA placement tomorrow by explaining what to expect post procedure to help lessen additional anxiety about another trip to the OR. Family requires frequent interventions by RN as well to help them understand the plan of care, the need for long term rehabilitation and to help them deal with their fears.
Behavior/Emotional Mgmt -q 1 Hour		
Safety Management- q 2 Hours	X	Patient is restless at times and may accidently dislodge lines.
Safety Management - q 30 Minutes		
Isolation Precautions (Transmission-Based)	X	Patient is on contact precautions.
Physiological Assessment- q 4 Hrs		
Physiological Assessment- q 2 Hrs		
Physiological Assessment- q 1 Hr	X	Vital signs and fluid output and input are assessed & documented every hour; also requires hourly assessment of response to sedation and pain medications.
Physiological Assessment- q 30 Minutes		
Medication Prep >= 20 Minutes		
Wound/Injury Management		
Wound/Injury Mgmt >= 30 Minutes	X	Burn wound care (3 hours of wound care) today.
Healthcare Mgmt Education >= 1 Hr		
1 to 1 Physiological Interv.>= 2 Hrs		

Blake 10 – Neonatal ICU

Today is day of life #25 (corrected gestational age = 28 weeks) for patient who is a former 24-3/7th-week infant with severe Intrauterine growth restriction (IUGR). Birth weight = 415g; current weight = 660g. He continues in the NICU for management of issues related to his prematurity including respiratory distress syndrome, evolving chronic lung disease, respiratory immaturity, thermoregulatory immaturity, and feeding immaturity. He is status-post patent ductus arteriosus (PDA) ligation (failed indomethacin course x 1) and was started on an early course of methylprednisolone for the prevention of bronchopulmonary dysplasia (BPD). Extubation was trialed yesterday, but he was reintubated the same day. He is breathing comfortably on synchronized intermittent mandatory ventilation (SIMV) pressure support with settings of 20/8, rate of 30, requiring 34%-40% oxygen to maintain his oxygen saturations within retinopathy of prematurity (ROP) parameters. He is tolerating total fluids of 145 cc/kg/day of breast milk 28 via nasogastric feeding tube on a pump over 1 hour. Medical team called to bedside for slight dusky appearance of abdomen overnight; KUB obtained, read as normal; no signs of feeding intolerance. He has a Broviac central line to his right chest with occlusive dressing intact. Left thoracotomy site steri strips clean, dry and intact. He continues in a covered Giraffe isolette on servo mode. Decreased environmental stimulation and cluster care to promote rest and growth. Parents are very active in patient's care and mom kangaroos daily.

MEDICATIONS: Caffeine and prednisolone 1 mg/kg/day, day #4 of 5.

QuadraMed Indicator Documentation Sheet

Indicator Name	Indicator Selection	Rational for Selection
ADL-Self/Minimal Care		
ADL-Partial Care		
ADL-Complete Care	X	Neonates are completely dependent on staff for all ADL needs.
ADL-Rehabilitative	X	RN working in collaboration with occupational therapist to maximize patient movement / mobility; to encourage sucking; and provide stimuli needed to encourage the sensory development and equilibrate the sleep-wake cycles.
ADL Assistance-2-3 Caregivers		
ADL Assistance-4 or more Caregivers		
Communication Support		
Cognitive Support		
Behavior/Emotional Management		
Behavior/Emotional Mgmt -q 1 Hour		
Safety Management- q 2 Hours	X	Patient is at risk for dislodging lines and / or tubes when active (arms moving towards face).
Safety Management - q 30 Minutes		
Isolation Precautions (Transmission-Based)		
Physiological Assessment- q 4 Hrs		
Physiological Assessment- q 2 Hrs		
Physiological Assessment- q 1 Hr	X	Vital signs are assessed & documented Q hour.
Physiological Assessment- q 30 Minutes		
Medication Prep >= 20 Minutes		
Wound/Injury Management	X	Surgical incision care and line dressing changes.
Wound/Injury Mgmt >= 30 Minutes		
Healthcare Mgmt Education >= 1Hr	X	Ongoing teaching with parents including parenting skills, discharge teaching, medication teaching and physical therapy exercises.
1 to 1 Physiological Interv.>= 2 Hrs		

Please see the attached supporting documents.

EXHIBIT A

Clinical Indicators

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

}	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

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.

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**.

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**.

EXHIBIT B

1 Hr+ Activity Indicators

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

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

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.

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.

EXHIBIT C

Staff Nurse View of QuadraMed Patient Classification Selection Screen

QuadraMed AcuityPlus Productivity, Benchmarking and Outcomes 8.3.3

Patient View Context Staffing Report Assignment Outcomes Tools Interface IRRT Help

The ICU (MGH)

Patient Selection - 5 patients (visible 2 hours post-discharge)

Patient Edit View Classify Activity Outcomes Tools Transparent Help

ADT U

Date 1/19/2016

	Location ^	I/O	Patient Name	Type	Complexity	Activity	Last Classified	Classified By	Edited	Age	Gender	Registration	Departure	Admit	Discharge
▶	12 A	I	MGHICUTEST, PATIENT A	5	5	1+	1/19/2016 8:08:05 AM	WHITE, BETTY		36	F			12/25/2015 2	
	14 A	I	MGHICUTEST, PATIENT B	6	5		1/19/2016 8:08:20 AM	SMITH, MARY		84	M			1/8/2016 10:3	
	16 A	I	MGHICUTEST, PATIENT C	4	4		1/19/2016 8:08:27 AM	DOE, JANE		18	F			1/18/2016 2:0	
	18 A	I	MGHICUTEST, PATIENT D	5	5		1/19/2016 8:08:35 AM	REED, DONNA		53	M	10/9/2015 3:1	10/10/2015 3	10/10/2015 3	
	(xfer-out)	I	MGHICUTEST, PATIENT E	4	3		1/19/2016 8:00:00 AM	DOE, JANE	1/19/2016 8:15:45 AM	60	F			1/15/2016 4:3	

EXHIBIT C (continued)

Window Used by Staff RN to Classify Patient

View Classification(s) - MGHICUTEST, PATIENT D Acct = 5000234567

Unit	Methodology	Type	Treatment Area	Classified
The ICU (MGH)	Inpatient	5		1/19/2016 8:08:35 AM
The ICU (MGH)	Inpatient	5		1/19/2016 1:00:00 AM
The ICU (MGH)	Inpatient	5		1/18/2016 2:46:21 PM

Inpatient

Indicator Name	Seq	19Jan 08:08	19Jan 01:00	18Jan 14:46
ADL - Self/Minimal Care	1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ADL - Partial Care	2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ADL - Complete Care	3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
ADL - Rehabilitative	4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ADL Assistance - 2-3 Caregivers	5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
ADL Assistance - 4 or more Caregivers	6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Communication Support	7	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Cognitive Support	8	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Behavior/Emotional Management	9	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Behavior/Emotional Mgmt - q 1 Hour	10	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Safety Management - q 2 Hours	11	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Safety Management - q 30 Minutes	12	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Isolation Precautions (Transmission-Based)	13	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Physiological Assessment - q 4 Hours	14	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Physiological Assessment - q 2 Hours	15	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Physiological Assessment - q 1 Hour	16	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Physiological Assessment - q 30 Minutes	17	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	19	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	20	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	21	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1 to 1 Physiological Interv. >= 2 Hours	22	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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

EXHIBIT D

Patient Type Chart with Associated Hours of Nursing Care

<i>Patient Types and Hours of Nursing Care</i>						
Patient Type	T1	T2	T3	T4	T5	T6
Acuity	0.7	1	1.5	2.3	3.1	4.6
Range of Direct Care Hours/24 Hours	0-4	4-7	7-10	10-14	14-20	20+
Average Range of RN Direct Care Hours/24 Hours in ICU	0-4	4-6	6-9	9-12	12-18	18+

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 greater at specified times. 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.

EXHIBIT D (continued)

ICU RN Staffing: Nurses can adjust staffing based on professional judgment

Blake 8 - Cardiac Surgical ICU	1:	1.1
Ellison 9 - Cardiac Care Unit	1:	1.2
Lunder 6 - Neuro ICU	1:	1.3
Blake 7 - Medical ICU	1:	1.1
Bigelow 6 - Pediatric ICU	1:	1.2
Ellison 4 - Surgical ICU	1:	1.1
Blake 12 - Surgical ICU	1:	1.2
Blake 10 – Neonatal ICU	1:	1.5
Ellison 14 - Burn ICU*	1:	1.7

*Burn ICU patient census inclusive of patients that are not ICU-level care.

Patient Types

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 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 is 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 5.8 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.

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 adult 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 and definitions), 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 and definitions). 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.

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."]