



FAST HUG : ICU Prophylaxis

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What is the FAST HUG mnemonic and how can it be used?

FAST HUG is a mnemonic used in the intensive care unit (ICU) to aide healthcare professionals in preparation for patient rounds, help identify and prevent medication errors, promote patient safety, and maximize therapeutic interventions.¹ FAST HUG is a mental “checklist” that highlights key aspects in the general care of the critically ill. The mnemonic stresses the importance of the following in clinical practice: Feeding, Analgesia, Sedation, Thromboembolic prophylaxis, Head of bed elevation, stress Ulcer prophylaxis and Glycemic control. FAST HUG can be applied to all ICU patients.

FAST HUG was devised by Jean-Louis Vincent, MD, PHD, FCCM and is used in countless institutions around the country to help provide safe, efficient and effective care to ICU patients. It allows ICU team members (i.e. physician, nurse, pharmacist) to prioritize the vast amounts of available data that must be collected, organized, and analyzed prior to patient care.

FEEDING

Why should patients be fed in the ICU?

The notion that malnutrition affects outcomes in critically ill patients was first reported in 1936 in a study showing that malnourished patients undergoing ulcer surgery had a 33 percent mortality compared with 3.5 percent in well-nourished individuals.² A prospective study of 500 patients admitted to an acute care teaching hospital in England determined that 40 percent of patients were undernourished on presentation, and patients lost an average of 5.4 percent of their body weight during their hospital stay. Consequences of malnutrition include impaired immune system function leading to increased susceptibility to infection, poor wound healing, increased frequency of decubitus ulcers, overgrowth of bacteria in the gastrointestinal tract, and abnormal nutrient losses through the stool.

It is recommended that nutrition be initiated as soon as feasible in patients admitted to the ICU. This generally occurs after the patient has been adequately resuscitated and is hemodynamically stable. Feedings started within the first 24-72 hours following admission are associated with decreases in gut permeability, diminished activation and release of inflammatory cytokines and reduced systemic endotoxemia, as compared to patients who have feeding initiated after 72 hours.³ Significant reductions in infectious morbidity and mortality have been found in patients who receive early enteral nutrition, as compared to delayed feeding.⁴⁻¹⁴

What nutritional markers can be used in these patients?

The traditional biomarkers of nutrition, such as albumin, prealbumin, transferrin and retinol binding protein, may be inaccurate reflections of nutritional status in critically ill patients due to the acute phase response occurring in these patients. However, these biomarkers are commonly used by many clinicians to determine a patient's response to nutritional supplementation. Prealbumin is commonly used, as it is more sensitive to acute changes in nutritional status.¹⁵

What are the nutritional requirements of most patients in the ICU?

Nutritional requirements of patients in the ICU may be determined by indirect calorimetry or by predictive equations. Predictive equations may provide inaccurate measures of energy requirements but may be more feasible to perform in critically ill patients. One of the most simplistic formulas is: 25-30 kcal/kg/day.¹⁵

What are the protein requirements of most patients in the ICU?

Protein is most likely the most important macronutrient in the critical care setting, as it is involved in wound healing, immune function and maintenance of lean body mass. Protein requirements will be proportionally higher in the critically ill patient. Modular protein formulations can be supplemented in patients to help achieve a protein requirement of 1.2-2 g/kg/day.¹⁵

How should patients receiving enteral nutrition be monitored?

Patients should be monitored for intolerance to the feeding. This can be done either by patient complaints of pain and/or abdominal distention, passage of flatus, bowel movements, and abdominal radiographs, if necessary. Gastric residuals can be monitored but holding of enteral nutrition for residuals of less than 500 mL in the absence of any other signs of intolerance should be avoided. However, many institutions will hold enteral feedings in the event of residuals greater than 200 mL.¹⁵

What adjunctive therapies can be used to help improve gastric motility?

Several prokinetic agents can be used to help improve gastric motility in critically ill patients who are receiving enteral nutrition. These agents include:

Erythromycin 250 mg IV Q8Hrs

Metoclopramide 5-10 mg IV Q6-8Hrs

Azithromycin 250 mg IV Q24Hrs

Methylnaltrexone 12 mg (weight 62-114 kg) Q48Hrs PRN

When should parenteral nutrition be initiated?

If enteral feeding is not feasible or available within the first 7 days of the ICU stay, nutrition support can be withheld, especially in those patients who were previously healthy without evidence of protein-calorie malnutrition. Parenteral nutrition can be initiated after 7 days if necessary to help maintain adequate nutritional status. However, in patients with evidence of protein-calorie malnutrition, in whom enteral feeding is not feasible, parenteral nutrition can be initiated as soon as possible.

ANALGESIA

What is analgesia and why is pain control important in the ICU?

Analgesia is defined as the blunting or absence of pain or noxious stimuli. Patients admitted to the ICU commonly experience a number of stimuli that could lead to pain, including: preexisting disease, invasive procedures, traumatic injuries, invasive and non-invasive monitoring devices, routine nursing care and prolonged immobility. These stimuli can affect both physiological and psychological recovery leading to inadequate sleep, pulmonary dysfunction and an acute stress response that can manifest as immunosuppression, hypercoagulability, protein catabolism and increased myocardial oxygen consumption.¹⁶ In 2002, the Joint Commission for Accreditation of Healthcare Organizations stressed the importance of pain management by declaring pain level to be the 'fifth vital sign'.¹⁷

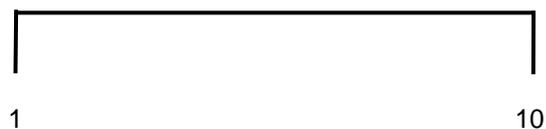
How should pain be assessed and monitored in the ICU?

Pain assessment should be completed in a systematic fashion using any number of validated rating scales. These subjective scales include, but are not limited to:

Wong-Baker FACES Pain Rating Scale:



Visual Analog Scale:



Verbal Rating Scale:

0 = No Pain, 10 = Worst pain ever

Unfortunately, not all patients in the ICU can communicate their pain via subjective scales. For example, in mechanically ventilated patients who often require sedatives and/or analgesics to maintain a level of comfort, physiologic indicators such as fluctuations in heart rate, blood pressure and respiratory rate are useful in the assessment of pain. However, these objective indicators of pain are relatively nonspecific and further investigation of the patient is required.

No matter the monitoring method, frequent re-assessment of pain should be done by all members of the ICU team. This will help to decrease unwanted adverse effects of the analgesics (i.e. oversedation), while maximizing efficacy and preventing inadequate pain control. For example, commonly used ICU analgesic modalities such as the opioids must be monitored to ensure that respiratory depression and subsequent respiratory compromise does not occur due to excessive use.

What medications can be used to control pain in the ICU?

Any number of medications and administration strategies can be used for the management of pain in patients being treated in the ICU. Generally, non-steroidal anti-inflammatory drugs (NSAIDs) or acetaminophen can be used for the treatment of mild to moderate pain and may reduce opiate requirements.¹⁸⁻²⁰ Patients experiencing severe pain will often require opioid analgesics, such as oxycodone, morphine, hydromorphone or fentanyl, to achieve adequate pain control. These agents can be given either as oral doses, intermittent intravenous (IV) boluses or continuous IV infusions, depending on the patient's pain control needs.

SEDATION

Why is sedation management important in the ICU?

Patients in the ICU often experience a number of situations that lead to anxiety. These situations include, but are not limited to: an inability to communicate with family members or healthcare professionals, excessive noise due to alarms, procedural lighting, excessive stimulation necessary to assess the patient and sleep deprivation. This anxiety can evolve into the development of agitation which occurs at least once in 71% of all medical / surgical patients.¹⁶

Agitation is defined as a state of psychological or physical restlessness. Causes include anxiety, delirium, uncontrolled pain and medications/medication withdrawal. Consequences of agitation include ventilator dyssynchrony, an increase in oxygen consumption and inadvertent removal of devices and catheters.²¹⁻²⁵ The most effective method of treating agitation is to treat and/or prevent the underlying causes. In the ICU, sedatives agents are used to treat anxiety components of agitation.

How is sedation management carried out in the ICU?

Sedation in the ICU is achieved through a number of medications, from a variety of medication classes. Propofol is commonly used as a first-line sedative agent. It is an anesthetic/hypnotic agent known for its rapid onset and short duration. Hypotension secondary to peripheral vasodilation is common (3-26%) with this drug.²⁶ Propofol is an emulsion; therefore patients should be monitored for hypertriglyceridemia and pancreatitis. Propofol-related infusion syndrome (PRIS) characterized by dysrhythmia, heart failure, metabolic acidosis, and/or rhabdomyolysis has been reported with the administration of high doses (usually greater than 83 mcg/kg/min).²⁷

The benzodiazepines such as diazepam, lorazepam and midazolam are used for sedation. Diazepam and midazolam are rapid acting agents with short durations. Diazepam, however, is metabolized to a long-acting product that accumulates rapidly with repeat dosing. Renal and hepatic dysfunction should be monitored in patients receiving midazolam, as this medication has a metabolite that may accumulate. Lorazepam has a longer onset of action and longer duration as compared to diazepam and midazolam. Lorazepam injection also contains propylene glycol as the vehicle and patients should be monitored for the development of toxicity (ie. lactic acidosis).

The central α -2 agonists clonidine and dexmedetomidine have been gaining popularity as sedative agents. Generally, these agents are 3rd or 4th line sedatives used in patients with refractory agitation or withdrawal. Unlike the sedatives described above, dexmedetomidine causes minimal respiratory depression. However, it is only FDA-approved for short-term use and may cause bradycardia and hypotension.²⁸

How should sedation be monitored in the ICU?

A number of scales have been used to assess sedation in the ICU. Notably, the Ramsay Scale and the Riker Sedation-Agitation Scale are most commonly used. These scales can be used to direct titration parameters for ICU team members and should be utilized to assess the patient's response to sedative agents.

What is ICU delirium and how should it be treated?

Delirium is defined as a reversible impairment of cognitive processes, usually of sudden onset, coupled with disorientation, impaired short-term memory, altered sensory perceptions (hallucinations), abnormal thought processes, and inappropriate behavior. Delirium is found in up to 30% of hospitalized patients^{29,30} and is associated with increased morbidity and mortality^{31,32}, prolonged hospital stay³³, and subsequent deterioration in cognitive status³⁴. Treatment mainly consists of removal of any offending medications (i.e. benzodiazepines) and the use of antipsychotics such as haloperidol. More recently, atypical antipsychotics such as risperidone^{35,36}, quetiapine^{37,38}, and olanzapine^{39,40} have been used to treat ICU-associated delirium with success.

Thromboembolic Prophylaxis

Why is venous thromboembolism (VTE) prophylaxis important in ICU patients?

Venous thromboembolism (VTE) can manifest as a deep venous thrombosis (DVT) or a pulmonary embolism (PE). Risk factors include venous stasis, vascular injury and hypercoagulable disorders. A majority of ICU patients carry at least one risk factor for VTE; additional risk factors are considered to have a cumulative effect.⁴¹ Specific risks for ICU patients include surgery, trauma, immobility, malignancy, age, heart or respiratory failure, obesity, smoking and central venous catheters.⁴²⁻⁴⁷ Venous thromboembolism has been found to be one of the most common, serious complications in these patient populations, with approximately 10% of hospital deaths being attributed to pulmonary embolism.^{48,49} Although these high risk groups can easily be identified, it is impossible to predict which patients will experience a thromboembolic event. Therefore, it is prudent to assess all hospitalized patients for their VTE risk and add prophylaxis accordingly.

What agents can be used for VTE prophylaxis?

Heparin 5000 Units SQ Q8Hours

Enoxaparin 30 Units SQ Q12Hours (adjust for renal impairment)

Dalteparin 2500 – 5000 Units SQ Q24Hours (depends on patient population and risk stratification, adjust for renal impairment)

Fondaparinux 2.5 mg SQ Q24Hours (adjust dose based on renal function)

The decision regarding which pharmacological agent to use and how to dose the agent should be based on the most recent Chest Guidelines for the Prevention of Venous Thromboembolism.

What methods of non-pharmacologic VTE prophylaxis can be used?

Mechanical methods for VTE prophylaxis can be employed in the form of graduated compression stockings (GCS), intermittent pneumatic compression (IPC) devices and the venous foot pump (VFP). These devices work by increasing venous outflow from the legs and reducing the amount of venous stasis. However, these devices have been found to be less efficacious than pharmacologic VTE prophylaxis.⁵⁰⁻⁵⁵ However, they may be an acceptable option in patients with a high risk of bleeding and may have an improved efficacy when used in combination with pharmacologic VTE prophylaxis.⁵⁶⁻⁵⁹

Head of Bed Elevation

Why should the head of the bed be elevated and how high?

Studies have shown that elevation of the head of the bed to a 30-45 degree angle can reduce the incidence of gastroesophageal reflux and nosocomial pneumonia in patients who are mechanically ventilated.⁶⁰⁻⁶² Patients who are nursed at a 45 degree angle have been shown to have a decrease in aspiration of gastric contents as compared to patients who are nursed at a 45 degree angle.^{61,63,64} However, it is important that the patient's thorax also remain elevated, as many patients may slide down the bed when their head is elevated to this position.

Stress Ulcer Prophylaxis / Stress Related Mucosal Damage Prophylaxis

What is stress-related mucosal damage?

Stress-related mucosal damage (SRMD) is a form of hemorrhagic gastritis that can occur in critically-ill patients. Patients with SRMD have much higher mortality rates than those without (57% vs. 24%).⁶⁵ The pathogenesis is not fully understood and is most likely multifactorial including: acid hypersecretion, reductions in mucosal blood flow and ischemia-reperfusion injury. Two risk factors have been shown to be independently associated with SRMD: respiratory failure necessitating mechanical ventilation for at least 48 hours and a coagulopathy defined as a platelet count < 50,000/mm³, an INR > 1.5 or a partial thromboplastin time of >2 times the control value.⁶⁶ Bleeding occurred at a frequency of 3.7% if one or both of these factors were present and 0.1% if neither factor was present. Other risk factors include: head injury with a Glasgow coma scale ≤ 10, thermal injury involving > 35% body surface area, partial hepatectomy, hepatic or renal transplantation, multiple trauma with an injury severity score of ≥ 16, spinal cord injury, hepatic failure, history of gastric ulceration or bleeding in the previous year, medication use (corticosteroids, non-steroidal anti-inflammatory drugs, vasopressors) and hypotension.

What pharmacologic options are available to prevent stress-related mucosal damage?

Multiple agents have been studied for the prevention of SRMD. These agents generally exert their effects by reducing gastric acid secretions, neutralizing gastric acid secretions or direct gastrointestinal protective effects.

H2 Antagonists

Cimetidine 300 mg PO or IV Q6-8Hours, 50 mg/hour IV continuous infusion (adjust for renal impairment)

Famotidine 20 mg PO or IV Q12Hours (adjust for renal impairment)

Ranitidine 150 mg PO Q12Hours, 50 mg IV Q6-8Hours, 6.25 mg/hour IV continuous infusion

Proton Pump Inhibitors

Lansoprazole 30 mg PO Q24 Hours

Omeprazole 20 mg PO Q24 Hours

Pantoprazole 40 mg PO or IV Q24Hours

Other

Sucralfate 1 gram PO Q6Hours

The choice for agents will mostly be based on clinician opinion or hospital formulary status. No agent has been found to be more efficacious than any other for the prevention of SRMD. Proton pump inhibitors have not been approved by the FDA for this indication, and are generally reserved for patients requiring prophylaxis who have a concurrent GI bleed. Clinicians should also take into account specific patient information such as renal function and concomitant disease states when determining appropriate therapy. Common adverse effects of these medications include mental status changes, pneumonia, abdominal pain, diarrhea and headache.

Glucose Control

Why is glycemic control important in ICU patients?

Hyperglycemia in the critically ill has been shown to increase the rate of morbidity, mortality and health care costs.⁶⁷ Therefore, glycemic control is necessary in critically ill patients to help reduce the incidence of complications including decreased wound healing, increased infection risk, impaired GI motility, impaired CV function, increased risk of polyneuropathy, and increased risk for acute renal failure.⁶⁸

What is the recommended glucose level for patients in the ICU?

The current recommendation for glucose control in critically ill patients is 140-180 mg/dL.⁶⁹

What strategies can be employed to attain these glucose levels?

Continuous insulin infusions can be initiated in patients experiencing fluctuations in glucose levels >180 mg/dL or in those patients that are persistently hyperglycemic despite adequate treatment with short-acting insulin injections. Correctional insulin or sliding scale insulin regimens are typically used to maintain patients at goal or to realize a patient's insulin requirements. A growing number of clinicians are using longer acting insulin analogs such as insulin levemir, insulin detemir and insulin NPH to help simulate basal insulin levels. Clinicians must be aware of the risks and benefits of using these longer-acting analogs and be cognizant of changes in the patient's status, especially those related to caloric intake. Additionally, clinicians should monitor patients for signs and symptoms of hyperglycemia, such as: diaphoresis, tachycardia, lethargy, shakiness, tremors, convulsions, seizures and coma.

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