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Medications

Medications are a key part of the care a patient receives in the intensive care unit (ICU). The providers, nurses, and pharmacists team up to provide the best combination of medicine for each patient. Prescribed by a provider after a diagnosis is made, medications are approved or suggested by the pharmacists, and the nurse gives them while monitoring the patient for their effects.

Additionally, with the help of electronic medical records, the administration of medication is safer than ever. It is easy to see how much of each medication the patient has received, and harmful combinations of medicine are flagged to be avoided.

The first step in administering medication is to scan the patient's armband to bring up their medical profile. Next, the medication is scanned to confirm it matches what is prescribed for the patient. If any detail of this process does not match, for instance the wrong medication is scanned, this process will be interrupted, requiring the nurse to examine the prescription more closely. After the medications are confirmed for the patient, the nurse administers them.

A fundamental element of the nurse's job is to follow the "six rights" of medication administration: the right patient is receiving the medication, the right medication for the patient, the right route to administer it (meaning through the IV, swallowing, etc), the right time for it to be administered, the right dose of the medication, and the right effect of the medicine.

Nurse's Note

- If you do not know what medication you are taking, ask the nurse.
- By keeping track of the medications and whether they are having the right effect, you can be another "right" for the patient.
- Do not take your medications, supplements, or vitamins from outside the hospital without asking the nurse first. The medical team keeps track of everything, and many vitamins or supplements do not mix well with hospital medications.
- Let the nurse know if you are not getting the medications that you usually take outside of the hospital.

Medication Timing

Knowing the scheduling of medicine is important for patients and families. Usually, it is ordered in timed segments. For instance, Tylenol, the brand name for acetaminophen, can be ordered to be given every 6 hours. So, the patient receives it at 6 AM, 12 noon, 6 PM, and midnight. Nurses have some wiggle room in when they can administer the medicine. They have about an hour before and after the medication is scheduled to give it. For example, if it is scheduled at 6 AM, it can be given from 5 to 7 AM. This range can differ depending on the hospital.

Another type of order is called a PRN, Latin for "as needed." These medications can only be used in specific situations. For instance, the order may say that it can only be administered if the patient is experiencing breakthrough pain—pain that surges even though it should be under control by the scheduled meds. The instructions may be "give for pain greater than 7 out of 10, every 6 hours." Therefore, nurses can give that med for greater than 7 out of 10 pain at 6:00 AM, but then cannot give it again until noon. It helps to be familiar with these rules so the patient can know when to expect medications that are already ordered and decide if extra medication needs to be prescribed.

Nurse's Note

- If you notice that you received a helpful medication earlier and then not again (eg, cough medicine, eye drops, sleep aid, nicotine patch, pain medication), it may be ordered PRN. Ask the nurse if it is still available or if the provider can order it again.

Pain

Many ICU patients experience pain. Pain medicine, or analgesic, can help to reduce the pain. Frustratingly, there is a limit to what pain medicine can do. After an operation, accident, or illness, there still can be pain and discomfort no matter how much analgesic is given. So, the ICU staff tries to lower the pain to a tolerable level that allows the patient to work at recovering.

For example, eliminating all discomfort following broken ribs is rare. If pain is preventing these patients from breathing effectively, they will not be able to get out of bed and move around—an important part of recovery. Pain also disrupts sleep, hunger, and mood, and these problems result in worse healing. Thus, enough pain control is needed to recover and avoid complications from the injury.

Problematically, too much pain medicine can cause drowsiness and a reduction in actively recovering. For instance, an overmedicated patient can feel less motivated to work with the physical therapist or may be unable to safely participate in swallowing practice with the speech therapist. Therefore, the best goal is to use the least amount of medicine to make the pain tolerable. Too much pain sidelines the patient. Too much pain medicine slows recovery.

Each patient's pain tolerance is different. A 95-year-old woman may barely flinch when a chest tube is pulled from her lung. Also, a 30-year-old man may agonize as a piece of tape is pulled off his hand. Both of these reactions are equally valid, and care is taken to support each individual's needs.

To do this, the ICU staff asks the patient for a pain goal that is acceptable, realistic, and allows for participation in recovery. Thankfully, the caregivers and patients have many ways to work together to find that sweet spot.

For patients who can communicate, pain usually is assessed on a 0 to 10 scale, where 0 is no pain and 10 is the worst possible. It helps to add descriptions, such as aching, stabbing, throbbing, etc, and where the pain is felt. In addition, try to remember when it started and note if anything makes it better or worse. With this information, caregivers can get a better idea of what is bothering the patient, what may help best, and compare it to pain felt later.

Nurse's Note

- Providing details about your pain allows the medical team to treat it better. A helpful way to describe your symptoms is to remember the letters of the alphabet OPQRST.
- Onset—When did your pain start?
- Provokes—What makes your pain worse?
- Qualities—What does your pain feel like?
- Region—Where is your pain?
- Severity—How bad is your pain on a 0 to 10 scale?
- Treatment—Has anything helped your pain?

Other tools are used to help the ICU staff rate pain for patients who cannot communicate. For these patients, caregivers can assess grimacing, moaning, and other clues that indicate discomfort. By comparing those signs before and after pain medicine is given, the ICU staff can see if that medicine is effective.

The goal is to reduce the pain to a tolerable level as soon as possible. However, effectively managing pain does not happen immediately. Pain medications take time to work, and they do not work for all patients. Other ways to reduce pain without medicine, such as ice and heat, also have to be tried. The medical staff thanks all patients for working through this challenging process.

Nurse's Note

- Pain tolerance is a personal experience for the patient that can change in different settings. The pain a patient feels now is true and valid, even if it seems like it should not be "that" painful. Additionally, patients may act fine, but say their pain is terrible. It is important that the medical team and family support patients in both of these scenarios because the patients are the only ones who truly know the pain they are experiencing. If you respond to how your loved one is, not how you expect your loved one to be, they feel supported and are more likely to work to get better.
- Think about whether the pain you are experiencing is a new pain that recently started (acute) or a pain that you have experienced for a while (chronic). If it is a chronic pain (for example, lower back pain you have had for years), tell the nurse if anything helps relieve the pain at home. Those options, or similar ones, may be available in the hospital.

Managing Pain Without Medicine

There are many ways to reduce pain without medication, and the ICU staff uses these as much as possible. These options may be called nonpharmacological pain management. They have few side effects and can help reduce the amount of pain medicine that is needed.

Spending time in bed can cause muscle aches. Heat can be used to soothe an achy back or neck. It helps loosen up muscles that are sore or tight. It is great before physical therapy to get the patient ready to move.

Ice helps numb pain and reduce any swelling. Patients with recent injuries or surgeries can benefit from icing swollen or painful areas. Ice may be especially useful after activity to reduce any nagging pain. Additionally, it can help reduce a headache.

Changing position in bed helps relieve pressure on the body. If possible, getting out of bed for a walk or into the chair can feel even better. It helps get the blood moving, exercises the lung and muscles, and gives the patient a sense of accomplishment. If a patient had a chest surgery, a technique called splinting can reduce pain during movement. The patient holds a pillow to their chest while coughing or moving.

Distraction is another effective tool. The family can help by making the patient think about other things besides pain. For instance, playing music or watching a movie can help pass the time. Talking to the patient about their day, remembering positive experiences such as vacations or time outside of the hospital, or even a massage can take their mind off of the pain. Another type of distraction is acupressure, which makes the patient feel the part of the body being touched more than the pain. Focusing on breathing and mindfulness can also reduce pain sensation, and there are many phone apps to help practice this. The family is welcome to suggest other options to help with pain control.

Each option helps time pass until the next pain medication is needed. Although it is OK to take pain medicine if necessary, it is better to help the patient heal with the least amount possible. If the amount of medicine is reduced, the patient is less likely to have bad side effects.

Nurse's Note

- Encourage the patient to try these types of pain control.
- Ask the nurse to show you safe ways to massage and perform acupressure, and if other medication-free ways to reduce pain can be used.

Pain Medicine

There are multiple types of pain medicine that are commonly used in the ICU. Usually, patients think of opioids as the answer for pain. Examples include fentanyl, oxycodone, morphine, and hydromorphone. Although safe and effective for intense pain, they can create other issues.

Opioids can cause constipation, drowsiness, nausea, and increase the risk of aspiration. They also can reduce the drive to breathe and lower blood pressure, which can be a problem for those patients who already have breathing or blood pressure issues. Worryingly, they can cause dependence and addiction if used for extended periods. Because of these reasons, the ICU staff tries to use the least amount of opioids possible to make pain manageable. To help achieve this goal, other non-opioid pain medicines are given for additional relief. This strategy is called multimodal pain management.

Nurse's Note

- Because many patients are constipated due to surgery or opioids, intense gas pains can result that are distressing. A medicine called simethicone can provide relief.
- If you use opioids at home, let the ICU team know. This helps the ICU team develop a better pain management plan for you.

To reduce the amount of opioids needed, acetaminophen is commonly prescribed. When used with opioids, the total amount of pain medicine needed is usually decreased. Acetaminophen is

helpful for many types of pain, including headaches and soreness accompanying surgeries, and for lowering fevers. This medicine may be avoided for those with liver injury, as it can cause liver damage.

Nurse's Note

- IV acetaminophen can be helpful if you are in severe pain and want to reduce your opioid use.

Other non-opioid pain relievers are ibuprofen and ketorolac. These are a type of medication called a nonsteroidal anti-inflammatory drug (NSAID), and they reduce inflammation and pain. Although effective, they are given less frequently than acetaminophen because they can cause stomach bleeding and kidney damage.

Another way to reduce pain is a lidocaine patch. This sticky pad is left on for 12 hours and numbs the area where it is placed. Lidocaine works best for muscle aches and pain felt just below the skin.

Nurse's Note

- If moving hurts, taking pain medicine before working with physical therapy (PT) and occupational therapy (OT) can help the patient have more effective therapy. This is called premedicating. Take oral medications about an hour before and IV medications about 10 minutes before the activity.
- Take note of how different pain medications make you feel. For example, if IV opioids make you sleepy, they may not be the best choice for pain control before PT. Your nurse can help make a plan for you.
- Some hospitals have a pain service that specializes in helping patients with complicated pain issues. If pain has not been adequately controlled, ask if the pain service is available for consult. Importantly, give the ICU team time to find the right strategy for your pain management.

Patient-Controlled Analgesia: Patient-Controlled Pain Medicine

If a patient has intense pain for a long time, or is returning from surgery, the ICU team may use another tool in addition to scheduled and PRN pain medicine. Some hospitals use a medication pump that allows for patient-controlled analgesia (PCA). This can be programmed to deliver IV pain medicine continuously or on-demand, or both. If on-demand, the nurse gives the patient a button to press that can deliver the medicine about every 10 minutes. This allows patients to decide when they are in too much pain and helps to relieve anxiety about pain control. The PCA is set to a maximum amount of medication that can be given in an hour, and the medical team can increase this if it is not enough.

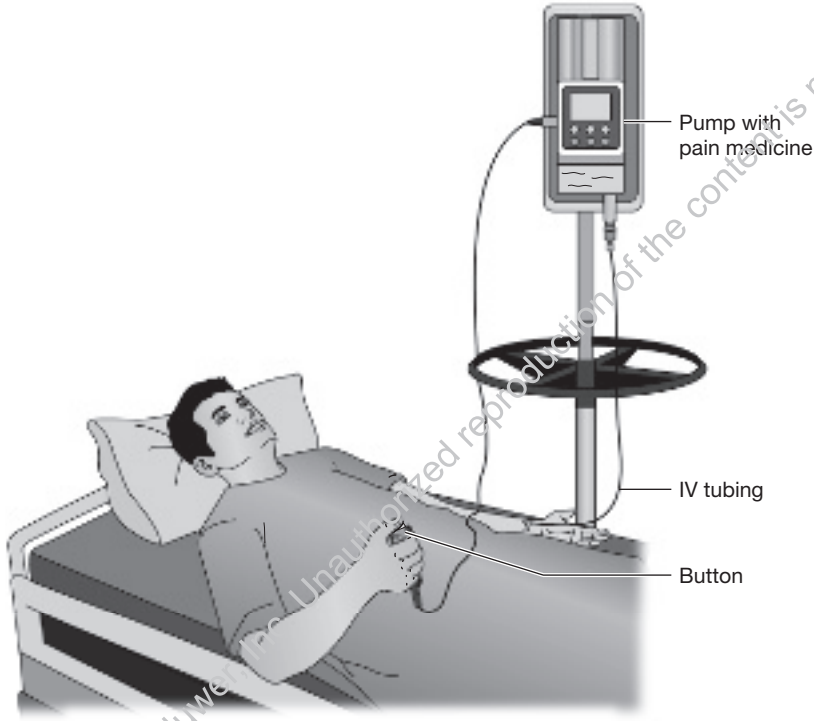
A similar tool for pain relief is the epidural PCA, which eases pain only in one area of the body. A tiny tube is placed in the back by the spine, and pain medicine flows through this. Similar to how the pain of labor is reduced during pregnancy, this blocks pain in specific areas. For instance, a patient may only have pain in the legs, which could be controlled with an epidural. This option is typically used after an operation, when it is known where pain control will be important.

Nurse's Note

- The epidural PCA, and opioids in general, may cause itching, which can be reduced with medicine.
- Only the patient should press the button for pain medicine.

Figure 5.1 Patient-Controlled Analgesia

Patient-controlled analgesia is a tool for pain management. Pain medicine is delivered when the button is pressed. It may reduce the anxiety of pain control and reduce the amount of pain medicine needed.



Vasoactive Medications: Controlling Blood Pressure

Vasoactive medications are used to increase or decrease blood pressure. They allow the ICU staff to lower dangerously high blood pressure (hypertension) to prevent bleeding and organ damage. Or, these medications can raise dangerously low blood pressure (hypotension) to help blood reach the patient's organs. These medications are given continuously by medication pumps, and the amount given is adjusted by the nurse. These medications save lives.

The vasoactive medications that decrease blood pressure work by slowing the heart rate or widening (dilating) the blood vessels. Examples of these medications are nicardipine and nitroglycerin. These types of medicine are commonly used to prevent the dangerous effects of high blood pressure, such as bleeding in the brain. They are also common after surgery. The ICU staff keeps the

patient's blood pressure in a narrow range to prevent the new, fragile incision from being forced open by high blood pressure.

If blood pressure is too low, the patient's organs do not receive the oxygen needed to function. This damages the organs and can cause death. To raise blood pressure, vasoactive medications narrow (constrict) blood vessels or increase the ability of the heart to pump blood. These medications can also be called vasopressors, or pressors. Examples of vasopressors include norepinephrine and dopamine. They are used for very sick patients and require a central line to administer them safely. An arterial line is preferred when using these medications because it provides a real-time blood pressure reading. This indicates to the ICU staff if more or less of the vasopressor is needed to reach the right blood pressure.

Generally, the blood pressure goal is to keep the patient's mean arterial pressure (MAP, the number to the right of the top and bottom blood pressure numbers) greater than 65. This is the pressure needed to deliver blood to the organs. If the MAP stays below 65, more of the vasopressor is given. However, there is a maximum amount that is effective, and another vasopressor may be added if the limit of the first is reached. Sadly, the patient's chance of recovery becomes worse when more vasopressors are needed. As patients get better, they are slowly taken off of these medications one at a time, so long as the MAP is greater than 65.

Sedation: Calming the Patient

Patients can experience anxiety and distress from their illness, being in the ICU, and treatments needed to make them better. Sedation medication not only helps calm patients, but it also allows the ICU therapies to work more effectively.

Which medication the staff uses depends on what level of sedation the patient needs. The levels are mild, moderate, deep, and general. General sedation is only used in the operating room, so the highest level experienced in the ICU is deep sedation.

Mild Sedation: Reducing Anxiety

Mild sedation is used for anxious patients. The ICU staff tries all other relaxation strategies before medication is used. Depending on what is causing the distress, these patients are usually given anti-anxiety medicine or pain medicine to relax them.

Nurse's Note

- Family is very helpful in calming anxious patients. Focusing on breathing, tidying up their space, supporting the patient by saying "you are doing a good job," massages, music, conversation, pictures, holding a hand, video games, phone calls, etc, are all welcome.
- Encourage your loved one to focus on doing things that make them better. For instance, use the incentive spirometer, do some of the exercises PT or OT left for the patient, ask the nurse to walk, etc.
- Let the nurse know if you take anything for anxiety at home, or what usually helps with your anxiety.
- If you use tobacco, let the nurse know. A nicotine patch may help with anxiety.

Moderate Sedation: Relaxing the Patient During a Procedure

During painful or uncomfortable procedures, such as a bronchoscopy, a moderate level of sedation is best. This may also be called conscious sedation.

Different medications can accomplish moderate sedation. A common combination of medications is an opioid, usually fentanyl, to reduce pain, and a benzodiazepine, usually midazolam, to prevent memories of the event and anxiety. Patients are able to breathe on their own, but emergency equipment is available just in case it is needed. The medical team keeps a close eye on the patient and their vital signs during and after the procedure.

Nurse's Note

- Some of these procedures are sterile or uncomfortable to watch, so family may be asked to wait outside.
- The patient should return to how they were acting preprocedure within about an hour.

Deep Sedation: Relaxation During Extended Therapy

Deep sedation can be used for many critical illnesses, such as a patient with serious brain, heart, or lung problems. Because these

problems reduce the patient's ability to breathe, a breathing tube is needed. The combination of this tube, the help provided by the breathing machine (ventilator), and the therapies needed to treat these illnesses can be uncomfortable. Deep sedation makes these tolerable by relaxing the patient and reducing the ability to remember the experience. A commonly used medication to achieve deep sedation is propofol. It should be noted that propofol does not prevent pain. So, if the patient is in distress, pain medicine may need to be given.

Depending on the reason for deep sedation, patients can usually still respond in a sleepy way to the caregivers. The medical team uses the least amount of sedation to make the patient comfortable and allow the therapies to work. Too much sedation can cause the patient to have low blood pressure and spend a longer time in the ICU. Please see Sedation, page 92, for details about reducing and turning off the sedation.

Nurse's Note

- Some patients say they can hear what is happening around them under deep sedation. These patients enjoy their families talking to them, holding a hand, listening to music, etc, during these times. Be sure to check with the nurse to make sure it is OK.

Dexmedetomidine is a mild sedative that is useful in many scenarios. It reduces anxiety and does not decrease the ability to breathe. Patients can be awake and responsive while on this medication. Therefore, it can be given to patients without breathing tubes. Also, when added to the medications needed for deep sedation, it lowers the amount of other sedatives needed. However, it can decrease blood pressure and heart rate. The medical team keeps a close eye on the effects that these medications are having and adjusts them if necessary.

Ketamine is a medication that is used for both deep sedation and pain relief. It has no negative effect on breathing or blood pressure, but it can cause hallucinogenic experiences at high levels. The ICU staff tries to minimize these by using the least amount of medication necessary. Combining ketamine with other sedatives can lower the total amount of sedation medication needed by the patient.

Paralytic: Preventing Patients From Working Against Themselves

ICU patients sometimes work against the therapies that are helping to save their lives. Although the patients are not doing it on purpose, the ICU staff needs to prevent them from disrupting their treatment. The best way to help these patients is by using medication that temporarily paralyzes them. This is reversible, and it can save lives.

For instance, patients can prevent the ventilator from giving enough air by coughing or trying to breathe on their own. This is known as fighting, or being dyssynchronous, with the ventilator. This makes the therapy less effective. After the patient is temporarily paralyzed, the uninterrupted ventilator is able to give the right amount of air to open the patient's lungs.

The first step is to bring the patient under deep sedation. This is to make sure that they are unaware of the temporary paralyzation. A paralytic medication, such as cisatracurium, is then infused. The patient is not given too much because this can weaken their muscles and make their ICU stay longer. Usually after 48 hours, the paralytic is stopped, and it naturally wears off. If safe for the patient, the sedation can then be reduced.

To make sure the right amount of medication is given for paralysis and sedation, two tools are used. The first is bispectral index monitoring (BIS). This measures the patient's brain waves to make sure they are not aware of the paralyzation. The BIS number matches the amount of the patient's brain activity. As the patient goes into deeper sedation, the BIS number decreases because there is less brain activity. An awake patient has a BIS number near 100, while the goal for sedation is around 40 to 60. The nurse adjusts the amount of sedation given until the patient is in this range.

The other tool, train of four, measures the paralytic's effect on the patient by sending four small electrical pulses through face, hand, or ankle nerves. In a patient with no paralytic, these shocks cause four small muscle twitches. As more medication is given, fewer twitches occur. The goal is usually two or three twitches. The nurse adjusts the amount of paralytic to achieve this goal.

Figure 5.2 Bispectral Index Monitor

The bispectral index monitor measures the patient's brain activity. Typically, it is used when giving both sedating and paralyzing medications.

Figure 5.3 Train of Four

The train of four measures the patient's response to paralyzing medication. The electrodes can be placed on the forearm, brow, or ankle.