Avoiding Respiratory Depression During Conscious Sedation
Podcast with Richard Kenney, MSM, RRT, NPS, ACCS, RCP
(Director, Respiratory Care Services, White Memorial Medical Center, Los Angeles)

Pat Iyer:

Hi. This is a podcast from the Physician-Patient Alliance for Health & Safety. The podcast that we're presenting today is called “Avoiding Respiratory Depression During Conscious Sedation”.

Welcome to our podcast. My name is Pat Iyer. I'm a nurse. This program is generously supported by Medtronic and EarlySense.

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I have with me Rick Kenney, who is a respiratory care practitioner! Rick, could you please tell our listeners about your background and where you're working?

Rick Kenney:

Yes, I would. Thank you for an inviting me to speak today.

I am a respiratory therapist and have been for the past thirty years. I currently work in a facility in Los Angeles - White Memorial Medical Center - and I have been with this organization for the past three years.

Pat Iyer:

Terrific! Our topic today is respiratory depression and with a particular focus on people who are at risk during conscious sedation. We know that patients are often given opioids and other medications to reduce awareness during painful procedures. Why should we be concerned about the risk of respiratory depression even during conscious sedation?

Rick Kenney:

That's a good question. We know that patients react differently to medications. Some react lightly and some have some pretty severe reactions to it. Opioids at certain dosages can lead to respiratory depression, as we know. If too depressed, the risk of respiratory failure could occur and jeopardize the patient's health. If it goes unnoticed by those monitoring that patient, for

example, the patient may appear to be OK at a simple glance, but when the respiratory rate drops, we're now faced with a compromised patient. So, it's important that we pay particular attention to those patients receiving opioids.

Pat Iyer:

I know that the traditional way of monitoring patients in the past has been to use pulse oximeters to detect respiratory depression. Isn't it sufficient to use them?

Rick Kenney:

No, it's not. Pulse oximetry is only designed to detect oxygen saturation and heart rate, not the ventilatory status of a patient. By the time oxygen saturation has dropped and the alarms are alarming, you've gotten beyond that threshold of the patient having a quick recovery from that.

I've always been and will always state that one should never rely on the use of pulse oximetry as the only means of monitoring a patient's condition. Remember that monitors are only a tool to use, but the real monitoring is looking at the patient to see the readings that you're looking at match the patient's condition.

Pat Iyer:

Has your hospital decided to address this with different technology?

Rick Kenney:

Yes, we have.

As you know, The Joint Commission has made recommendations to include end tidal CO2 monitoring during conscious sedation procedures. We use CO2 monitoring in the OR during cases, so why not use that at the same time during conscious sedation procedures.

As stated earlier, patients react different to sedatives. I have a family member who is very sensitive to medications and what would be a standard dosage to a normal patient, this family member overly reacts to it. And, then on the other side, I have another family member who could take the dose that would knock a charging rhino down and it doesn't affect them at all.

So, it's really important that we have that additional tool - end tidal CO2 monitoring - just to have that extra safety net for the patient.

Pat Iyer:

Is there another term for end tidal CO2 monitoring?

Rick Kenney:

Well, we call it ETCO2 monitoring or capnography.

Pat Iyer:

OK.

Rick Kenney:

That's the abbreviation.

Pat Iyer:

OK. Tell us about when your hospital is using this. You mentioned in the operating room, but where else will it be used or is it being used?

Rick Kenney:

We are in the process of implementing it anywhere that conscious sedation is used. Right now we are using it in most procedures, such as bronchoscopies and GI procedures. We have a very large increase in the number of GI cases that we're doing, and so we're having to supply additional equipment to those areas to monitor the safety of those patients. It's also used in the cardiac suite where they do the transesophageal echocardiograms. We want to put those patients in a very relaxed state, but not put them out completely. We're using it with patients who have a very difficult time trying to go into an MRI scanner. So, we have anesthesiologists come in. They help put those patients at a very relaxed state while closely monitoring them. End tidal CO2 or ETCO2 is part of that monitoring.

Pat Iyer:

OK, I understand. I would like to switch the focus for just a minute to patient controlled analgesia pumps. There is a common misperception that I've heard specifically from nurses that, if the patient controls the frequency of the doses and the pump is programmed to limit the number of doses, it's not possible for the patient to receive too much medication. I know that this is an area that you have also looked at. Could you tell us why that statement is not true?

Rick Kenney:

Definitely. Again going back to the earlier statement that what affects one patient one way can differently affect another patient with that same dosage. In my last few years of my career with the introduction of the PCA pump and the ability to be able to self-dose with the same pump, we've received a lot of rapid response calls due to the changing condition of a patient. That's very concerning. And, so our organization has provided us with a device - an end tidal CO2 monitoring device that attaches to that PCA pump - the patient controlled analgesia device.

This is set up by respiratory care and is monitored by both the nurse and the respiratory therapist. We are monitoring to see if a patient reaches the preset parameters that we've set that patient based on her normal physiological condition. A case in point would be a patient suffering from chronic obstructive pulmonary disease. We want to set those alarms so that we're not getting a lot of nuisance alarms.

With the use of the end tidal CO2 device, when those parameters are reached, this is indicating that the patient is overly sedated, and it will pause the pain control pump and it cannot be reactivated until a nurse or respiratory therapist has gone to the patient's bedside and has physically evaluated that patient to make sure that they are awake and responsive and are able to answer questions appropriately.

If the alarm goes off one time and it self-corrects, then the device has done its job because the alarm is load enough not only for us to be able to hear it out in the hallway or another patient's room, but it startles the patient to wake up. And, if the patient starts breathing again and the alarm is still sounding, it's done its job.

When the nurse or the respiratory therapist comes in, they visually inspect that patient. They reset the pump to allow it to go back on and start delivering that again. And they're with that patient for up to fifteen or twenty minutes to make sure that the patient is literally awake enough to be able to handle the dosage. If the patient falls back to sleep a second time and it alarms, then it's the responsibility of nurse or respiratory therapist to get a hold of the physician to have that dosage reduced - thus protecting the patient from any harm.

Pat Iyer:

That's a wonderful combination of technology. I'm aware of several cases of people who have been over sedated by patient controlled analgesia pumps, without having the end tidal C02 monitor in place. Unfortunately, nurses have discovered them in a state where they are almost beyond being salvageable and in some cases the patient's died as a result of that over sedation. So, I'm really impressed with the safety aspect of what you've just described.

Rick Kenney:

Yes, I am too. I will be totally honest in that since the implementation of this combination of monitoring the patient, the number of rapid responses to those areas where the patient comes out with that PCA pump have - I want to say - a better than fifty percent reduction in calls of rapid responses.

So, I'm very impressed with that. This system is relatively new to your hospital (about six months) and in that time we are constantly educating and reeducating staff on the device and the need for the cannula, which is the device attached to the patient. We remind the patient and reeducate the patient (and the family members as well) that it needs to stay in place. So, it works. It's done its job.

Pat Iyer:

Let's talk a little bit about the use of oxygen during conscious sedation. I think some people might be under the impression that if the patient is receiving oxygen during conscious sedation and has a respiratory rate that's reduced, that the oxygen would prevent respiratory depression. Is that true or not true?

Rick Kenney:

That is not true. Oxygen in no way stimulates the respiratory system to breathe. That is just a monitoring device that's going to say, "Yeah, I've got enough oxygen in me. I'm doing good".

But the reality of it is - if I can use an example - you take a patient and they're on a two liter nasal cannula. We consider that to be a FiO2 - a fraction of inspired oxygen - to be around twenty eight percent roughly. If you take a patient and you put them through conscious sedation, on a PCA pump, they're over sedating themselves. The anatomical death space - being the space between upper airway and the trachea - becomes a reservoir where the oxygen keeps building up and building up, and so that concentration goes from twenty eight percent and keeps climbing and can go as high as sixty percent.

So, when that patient takes in that deep breath, they get all of sudden that bolus of oxygen, their saturation rises and so that gives that false sense of security. You know, if you're looking at just using that pulse oximetry only, you'll say "Heh, my patient is doing really good. I don't have to worry about it" - until such time that the respiratory rate has dropped so severely that the oxygen is not getting into their system and, at that time, you've gone beyond that threshold of not being able to bring that patient back safely.

The CO2 concentration is what stimulates the body to breathe. And, so, that's why we don't want to sedate so much that it knocks out that drive of the human body to respond.

Pat Iyer:

And why giving oxygen to somebody with COPD is such a hazardous situation if the oxygen levels are too high because it's knocking out the CO2 drive.

Rick Kenney:

Correct and glad that you brought that up. The CO2 can build up in a chronic obstructive pulmonary disease patient. If it happens over a period of time, eventually the body gets tired of trying to fight that battle. So, it reverts to what we term as hypoxic drive and - you're absolutely right - the body is looking at the oxygen levels in the bloodstream that's sitting there and if it climbs up too high, it tells the COPD body that "Hey I'm doing fine, go ahead and rest" - and then we just made the situation that's bad even worse.

Pat Iyer:

I know that your hospital has taken the initiative to address the risks associated with conscious sedation. Could you tell us why your staff has focused on this problem and what you've done about it?

Rick Kenney:

Actually I would like to say that it's more of an organization process. I belong to an organization that has several hospitals in it. And in our corporate office, they were listening to our teams from all the different facilities saying "Hey, you know, we've got a problem here".

And so they took the initiative to work with a vendor to bring in to all the hospitals a certain number of end tidal CO2 monitoring with a capability of monitoring oxygen levels at the same time. And, with that initiative, they're furthering that by coming up with a corporate policy on how this should be handled. And we have more than enough team members it to make it happen and to make it happen quickly.

Pat Iyer:

OK and what are you doing about that specific problem as a team?

Rick Kenney:

What we're doing is this. As you know, nurses are really kind of being inundated with so many things today with electronic documentation and so on and so forth, and the respiratory therapists want to do their part. So, we made an agreement with nursing group that respiratory therapists will be one hundred percent responsible for the application and monitoring of the end tidal CO2 devices, and we will round on those patients every four hours, as the nurses round every four hours as well. So, the patient is basically being seen every two hours. Respiratory will be responsible for the documentation in the electronic medical record of that rounding. At the same time, both the nurses and the respiratory therapists are there to educate the patient and the family on the precautions of using the pain pumps.

Pat Iyer:

I know we've just talked about the alarms associated with the patient controlled analgesia pumps. And, we know that if you walk into any hospital, you'll hear pumps - IV pumps alarming ventilators, cardiac monitors, other types of equipment alarming. I think it can get overwhelming for the staff and for visitors and for patients. I'd like to know your perspective on the term, alarm fatigue. What does that mean for you?

Rick Kenney:

Good question. Alarm fatigue is literally that. I've been again in respiratory for about thirty-two years - and in that time, you hear alarms go off constantly - the heart monitors, pulse oximetry when that became into the standard of care, now the inclusion of the IV pumps. And then you have the alarms that go off on different devices, other than those mentioned, and so it's a constant barrage of sound. Like anything that you hear constantly, over time you become deaf to it. And, so in that case, alarm fatigue happens when it becomes nuisance alarms.

The devices are not set to alarm for that particular patient. They are set for default settings. Patients move, patients scratch, patients pull on things and so whenever any of those things occur those machines are not able to detect the condition of the patient and so it's been programmed to alarm.

When you have several patients on the floor and they're all on one device or another with alarms attached to them, it's just a constant barrage. Note that we train ourselves to hear for specific sounds of alarms because manufacturers have learned over time you cannot have one alarm sound for every condition. So for us, our ventilators have three separate alarms and when we hear that one specific alarm we know that we drop whatever we're going to go find out

what's going on with that. But that can't be said for all the devices. If a patient goes to scratch, the heart monitor picks that up, it doesn't know what to do with it so it alarms. It self corrects in most cases but in other times the patient pulls on the oximetry probe or pulls on the electrodes attached to the EKG monitor, the alarms constantly go and go and go, and people just become numb to those sounds.

Pat Iyer:

Tying that to respiratory depression, how does that alarm fatigue affect that risk?

Rick Kenney:

On the pulse oximetry, in particular when it comes to respiratory depression, that alarm doesn't have any different sounds as to whether the patient's pulled the probe off, or the patient's moving, or the patients literally having an issue. When you have a ward with say twenty rooms on it and there's twenty devices going at the same time with pulse oximetry, you get so used to hearing those that you don't respond until you realize that alarm is not silencing itself. But, at that time, you could have gotten beyond that threshold point of being able to bring that patient back safely.

Pat Iyer:

I know that the term alarm fatigue is of concern to the health care providers and it's of concern to the people who are making the equipment. There are several efforts to try to address this from different perspectives, including how the manufacturers are adjusting those alarms or adjusting the sensitivity. But, what can we share with health care staff about what they can do about the risks of alarm of alarm fatigue?

Rick Kenney:

That's a good question you know. Right now, it's become such an issue that The Joint Commission has now made it one of the national patient safety goals to address alarm fatigue. Our organization at our corporate office realizes this is a big problem and has mandated each hospital find out what the concerns are at the staff level and also find a way to be able to help minimize those alarms. So, a policy is in the works and being developed that makes certain rules that we have to follow in order to make sure that alarm fatigue becomes a thing of the past, if there is such a place. We're going around and we're talking to staff, as part of that policy to make sure that the alarms are being set appropriately.

We've found that when patients are put on devices, they're just put on them and staff is just relying on the default settings for every patient, and we know that all patients are different.

Another point is that you have to be constantly educating the patient and the patient's family to know why that device is there and that why they need to leave the device in place to stop those alarms from going off and to know that it's there to protect them. The same is for staff that needs to be reeducated on how to go in and properly adjust those alarms and not adjust them to a point where a patient keeps setting off the alarm and it turns into a point to where it alarms because the patient is not being cooperative. That can lead to trouble in the long run.

Pat Iyer:

Yes, I'm aware of situations where alarms have been turned off because they were annoying and then when the patient condition has deteriorated, the audible signal is no longer there. They serve a really important safety function.

Rick Kenney:

One of the things I'd like to mention is - well, I think it's becoming a standard of practice amongst vendors - that they're incorporating a delay which can be implemented by the staff that they can put up to a fifteen second delay on nuisance alarms, meaning that if patient is scratching or moving, it's not going to immediately alarm like it did in the past. So, they have that fifteen second delay to allow the patient to scratch and go back to their resting state, and have the monitor be able to read appropriately again. My hats off to the vendors for that.

Pat Iyer:

Yes, absolutely. I want to conclude our program today by again focusing on the combination of pulse oximetry and end tidal CO2 monitoring so we can close the circle. And I know that you touched on it a little bit, but for our listener's sake, let's just again emphasize why it's important to combine both of those pieces of technology and not rely just on pulse oximeters to detect respiratory depression.

Rick Kenney:

Absolutely. The combination of the two allows us to cover, if you will, our bases, meaning that we can monitor the respiratory rate, the heart rate and cases of the pulse oximetry it gives us a better reading knowing that their profusion status is good. What I think is even better today than just a few years ago, is that the end tidal CO2 device and the pulse oximetry were two separate machines that took up a lot of space on the patient's bedside table with long cables running all over the place but, with today's devices that we're currently using have the pulse oximetry and the end tidal CO2 in one device. They have a built in algorithm rhythms that will let the respiratory therapist or the nurse taking care of that patient, give them the advantage of knowing that something is starting to happen with this patient because these two parameters are not matching in a way that they should, and you need to come in and evaluate your patient. And so because of that, we can intervene much quicker for patient safety than we did in the past; so the combination of being able to monitor both oxygen and ventilatory status is a win-win for the patient.

Pat Iyer:

I thank you for your time today, Rick. I know that it's gone by fast for me and I appreciate your expertise. This program has been generously supported by Medtronic and EarlySense.

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Thank you, Rick Kenny, for being part of our program. And please stay tuned for our next podcast.