

# Ethical Concerns that Arise When Working with Extracorporeal Membrane Oxygenation in the NICU: A Nursing Perspective

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## Abstract

The purpose of this article is to take a closer look at ethical concerns that neonatal intensive care unit (NICU) nurses face while performing terminal weaning or assistance on extracorporeal membrane oxygenation (ECMO) patients. The article explains the process of using and removing the extracorporeal membrane oxygenation and how it may be considered a last option of survival. It explains the ethical perspective of the difficulty in the weaning process, while also providing a critical analysis of the ethical issues using the four method approach to health care ethics which includes: beneficence and non-maleficence, patient preference, quality of life, and contextual features. The biggest obstacle nurses struggle with overcoming is not just the attachment they share with their patients, but the moral and religious concerns regarding the placement and removing of the ECMO. Research has always shown that nurses maintain a highly stressful job, specifically in the NICU. However, there are protocols and procedures that the employing health care facility can offer to help alleviate some of the associated stress and improve on the situation.

## INTRODUCTION

Patients in the neonatal intensive care often require assistive treatment in the form of a mechanical membrane oxygenation. This process uses a machine known as an extracorporeal membrane oxygenation machine to provide all or at least a portion of a patient's total ventilatory and oxygenation demands. Unlike a ventilator, which can be used in short-term applications such as surgery, drug overdose, injury, or acute illness, ECMO is mainly used solely to provide both cardiac and respiratory support oxygen to patients whose heart and lungs are no longer serving their function. These patients are mostly terminal and they require ECMO to maintain life and would die otherwise.

Neonatal intensive care unit nurses are highly skilled professionals that work mainly on three different levels. Level I consist of caring for healthy newborns, Level II caring for either premature or ill newborns, and Level III caring for newborns that cannot be treated in other levels and are in need of high technology to survive. Level III nurses obviously provide the direct patient care for the newborns on ECMO. These nurses are in charge of monitoring the ECMO, making sure the baby is responding well, and

checking for complications. It is the nurse's job to not only care for the infant, but also to have good communication skills with people, in particular with parents.

Once a patient is placed on the ECMO, there may come a time where it has been decided by the health care proxy, advance directives, or in some cases the medical support team to terminate the cardiac and ventilatory support for the patient. The nurse usually knows upon completion of this task death will come for the patient. This can lead to a huge ethical dilemma for many nurses as ultimately they are effectively playing a role in ending the life of another individual.

## LITERATURE REVIEW

### EXTRACORPOREAL MEMBRANE OXYGENATION (ECMO)

An extracorporeal membrane oxygenation (ECMO) is an extracorporeal technique used in intensive care medicine that provides both cardiac and respiratory support oxygen to patients whose heart and lungs are so severely diseased that they can no longer serve their function. To initiate ECMO, cannulae are placed in large blood vessels to provide access to the patient's blood. Anticoagulant drugs, usually heparin,

are given to prevent blood clotting, as the ECMO machine continuously pumps blood from the patient through a “membrane oxygenator” that imitates the gas exchange process of the lungs. The machine removes carbon dioxide and adds oxygen, in which the oxygenated blood is then returned to the patient. There are several forms of ECMO, the two most common of which are veno-arterial (VA) and veno-venous (VV). Both modalities oxygenate blood drained from the venous system outside of the body. In VA ECMO, this blood is returned to the arterial system and in VV ECMO the blood is returned to the venous system and no cardiac support is provided. VV ECMO can provide sufficient oxygenation for several weeks, which allows the diseased lungs to heal while the potential additional injury of aggressive mechanical ventilation is avoided.

Therefore, ECMO may be life-saving for some patients. However, due to the high technical demands, cost, and risk of complications, ECMO is usually only considered a last resort therapy. ECMO is most commonly used in the Neonatal Intensive Care Units (NICU), for newborns in pulmonary distress. The machine is around 75% effective in saving the newborn’s life. Newborns cannot be placed on ECMO if they are under 4 and a half pounds, therefore, ruling out the device for most premature newborns. Newborn infants are occasionally placed on ECMO due to the lack of a fully functioning respiratory system or other birth defect, but the survival rates drop to approximately 33%. Typically newborns remain on ECMO for three to seven days, with the average time limit for a newborn is usually around a 21 day maximum. Once the baby is off ECMO, they will still need a ventilator for a few days or weeks (Wikipedia, 2008).

## **NICU PATIENT**

Having a conscious, critically ill newborn hooked up or withdrawn from an ECMO is especially difficult for a nurse specialist in the NICU. Unlike adults in the intensive care unit, newborns are not able to communicate in any way with their family or physician for the most part. Adults often may show cognition by mouthing or writing words and making requests, however, newborns have not yet developed these skills yet. Obviously the NICU nurse specialist, along with physicians, and family make the decision to put the newborn on ECMO. However, the determination of when to stop ECMO rests upon demonstration of the return of adequate cardiac function to support vital organs and permit subsequent recovery. When weaning a newborn off of

ECMO support due to a heart condition, if the weaning is not successful and additional time does not lead to adequate recovery of cardiac function, the nurse and physician must be prepared to realistically advise families regarding such options as cardiac transplantation or withdrawal of support. It is critically important to provide an open and nonjudgmental environment for families to make these difficult decisions. The greatest difficulty involve the ethical and emotional decisions that need to be made in a timely fashion by the NICU nurses, besides the family, mainly because of their close, strong interaction with the newborn patient and families (Blackwell-Synergy, 1999).

## **FAMILY CONFLICT**

Another huge source of distress and hardships for NICU nurses and other clinicians alike is confliction with the family about the decision to place and withdraw the newborn on ECMO support. Unfortunately, NICU nurses can be viewed by families, community, and colleagues as merchants of death. Conflict about end of life issues is extremely common in the health care field. Family members because of their close attachment with their newborn patient often have a difficult time remaining objective about the specific prognosis.

It is important to remember that the family members and other clinicians may all be going through the different stages of the grieving process, as they all consider the fact that this critically ill newborn patient has not even had the chance to experience life. The stages of the grieving process include: denial, anger, bargaining, depression, and acceptance. Most families, and particularly some NICU nurses, take a considerable amount of time to reach the acceptance stage in the grieving process. However, clinicians and nurses tend to reach the acceptance stage much quicker because of their constant occupational exposure to death.

Repetitive research has showed that the best way to solve conflicts with family members is to most importantly understand the situation and communication. Families, especially parents of a newborn baby, are going through a difficult time and experience a roller coaster of mixed emotions. Again, communication plays an important role in reducing conflicts among family. The most common approach as a NICU nurse is to educate and negotiate with family members about conflicts that may arise around decision making, while also consoling them as well. Families often disagree about treatment plans because they are either misinformed of the disease and treatment, or do

not fully understand them. Once the newborn patient's prognosis and treatment plan have been properly explained, this may resolve many disputes on the delivery of care. NICU nurses and clinicians often have to realize that futile care has to be explained to families before they can realize that some therapies must be abandoned or never started for the good of the patient (Keene, 2007).

## **SUPPORT SYSTEM**

For NICU nurses to handle a newborn baby on ECMO support, they require the full support of the hospital to properly handle the whole process from an emotional, professional, and psychological stand point. New graduates or nurses that perhaps are new to the NICU should not be expected to handle dealing with an ECMO patient on their own. This would be too much stress and pressure for someone just entering the field to be expected to handle without the support of a veteran NICU nurse or physician to answer questions and provide advisement. Proper meetings and discussions are good ways to have open communication and personal opinion for the entire clinical team involved. This effective communication also provides an opportunity to discuss any opportunities for improvement in future ECMO newborn patients. All clinical members should have access to counseling services provided by the hospital. It is also not suggested for a NICU specialty nurse not to perform or deal with concurrent ECMO newborn patients (Keene, 2007).

Clinical decision support systems (CDSS) are computer-based information systems used to integrate clinical and patient information to provide support for decision-making in patient care. They may be useful in aiding the diagnostic process, the generation of alerts and reminders, therapy critiquing and planning, information retrieval, and image recognition and interpretation. This is another way that support systems can be viewed as a major role among nurses and other clinicians (Tan, Dear, Newell, 2005).

## **CRITICAL ANALYSIS**

### **BENEFACTENCE AND NON-MALEFACTENCE**

With the hopes of easily suffering and helping patients get well is how all health care clinicians enter the field of medicine. Nurses are trained to treat all patients with the best care possible under circumstance. The nursing theory seeks a collaborative relationship with the person in their care. It therefore emphasizes autonomy of the person being nursed over paternalistic practice where the health professional

seeks to do what they believe to be in the individual's or society's best interests. Codes of conduct for nurses tend to be based on the rights of the patient and the duties of the nurse rather than on utilitarian concerns of the consequences justifying the action. Therefore, when a nurse is faced with the issue of taking a patient off of the ECMO support, it goes against everything that the nursing field teaches, which is to do whatever it takes to keep the patient alive. The concept of non-maleficence is embodied by the phrase, "first, do no harm." Nurses are obligated under medical ethics to not provide medications or actions they know to be harmful. However, particularly in the neonatal intensive care unit, nurses violate non-maleficence when they might have to remove the life support system. When both beneficence and non-maleficence is violated, many nurses struggle with this and indeed they should. It is extremely difficult to switch modes for a nurse from providing every means of life support to a patient during a code who if they survive will most likely require some form of life support, to then turn around and have to terminate assistive support on another patient requiring ECMO. (Wikipedia, 2008)

### **PATIENT PREFERENCE**

The hard concept for clinicians to accept when dealing with end of life care management is the principle of respect for patient autonomy. It is very hard for most neonatal nurses to accept that sometimes parents choose death over a commitment to ECMO, and are therefore called upon to assist in the terminal weaning procedure. This is a perfect example of where patient autonomy comes in direct conflict with the nurse's obligatory duty of beneficence and non-maleficence. Autonomy has become more important as social values have shifted to define medical quality in terms of outcomes that are important to the patient rather than medical professionals. This can also become a major conflict when nurses have to discuss with the parents in NICU the recommendations that are believed to be in the patient's best interest, because the parents may not agree. The nurse must weigh their duty of care against the autonomy of the person in care. Sometimes it is extremely difficult for a nurse to suppress their heroic instincts and respect patient's wishes. (Code of Ethics, 2008)

### **QUALITY OF LIFE**

The perceived quality of life for each individual is subjective and unique to that particular individual. For example, one person or parent may find that living with severe brain damage and having to rely on caregivers acceptable and may

proceed on to lead a fulfilling life. However, another person or parent may face the same situation and find this quality of life to be unacceptable and decide that continuing life for the patient is undesirable. In the NICU, parents often come to the realization once the treatment plan and prognosis for their baby has been explained that their perceived quality of life is not worthy of continuing and elect to refuse to continue life sustaining measures. A portion of these life prolonging procedures that parents decide to terminate involved ECMO. Nurses discuss with the parents and can only determine if they were the patient would they choose to be terminally weaned. Once again the quality of life is highly subjective and individualized so it is likely that different people in a given situation will come to different conclusions for different reasons. Nurses witness an ethical dilemma if the parent chooses to terminally wean their baby even though they feel as if they could still yield a good quality of life. (Keene, 2007)

## CONTEXTUAL FEATURES

When it has been decided that a patient must be terminally weaned off the ECMO, nurses often find themselves in conflict with their personal religious beliefs. Although the nurse is not euthanizing a patient, they are removing equipment that will most likely always lead to death. Some nurses feel that in order to fully complete their job functions that they are forced to put aside and betray their religious beliefs. Stress is also added to nurses and brings up ethical questions about the facility and the health care system in general, when patients either can't afford ECMO or there is a shortage or no ECMO machines available. (Wikipedia, 2008)

## CONCLUSION

In the neonatal intensive care unit, ECMO is one of the forms of survival for a newborn that can make the most impact. When a nurse is faced to place a patient on ECMO or have to terminally wean them from it, they can be faced with one of the greatest ethical dilemmas in their profession. Even though it may seem for it to be easier for a nurse to deal with a patient who does not yet have an opinion for themselves yet, the patient hasn't even started a life yet and they also usually develop a close relationship with the family. Patient autonomy often comes in direct conflict with a nurse's duty of beneficence and non-maleficence which is essentially to do no harm or cause death. Nurses often fail to see the patient's perception of quality of life because it is

subjective in nature. The biggest obstacle nurses struggle with overcoming is mainly moral and religious concerns regarding the removal of the ECMO.

Although hard decisions in the NICU difficult parts of the job duties of a nurse, the process can definitely be less stressful when a strong support system is in place at the work place. Staffing schedules can be rotated so that the same nurse does not have to perform ECMO tasks all the time. Debriefing periods should also be scheduled after every patient must be terminally weaned to allow the nurses to voice any concerns or make suggestions within their peer group.

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