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CRITICAL CARE (SA MAYER, SECTION EDITOR)

Communication, Leadership, and Decision-Making in the Neuro-ICU

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Abstract The Neuro-ICU is a multidisciplinary location that presents peculiar challenges and opportunities for patients with life-threatening neurological disease. Communication skills are essential in supporting caregivers and other embedded providers (e.g., neurosurgeons, advanced practice providers, nurses, pharmacists), through leadership. Limitations to prognostication complicate how decisions are made on behalf of non-communicative patients. Cognitive dysfunction and durable reductions in health-related quality of life are difficult to predict, and the diagnosis of brain death may be challenging and confounded by medications and comorbidities. The Neuro-ICU team, as well as utilization of additional consultants, can be structured to optimize care. Future research should explore how to further improve the composition, communication and interactions of the Neuro-ICU team to maximize outcomes, minimize caregiver burden, and promote collegiality.

Keywords Communication · Leadership · Neuro-ICU · Shared decision-making · Patient decision aids · Multidisciplinary teams

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Introduction

History

Neuro-ICUs came into being to treat severe and acute illnesses involving the nervous system. The first Neuro-ICUs were founded in the 1930s for neuromuscular weakness due to polio. It was not, however, until 2004 that a neurocritical care specialty society was founded, and the first certification examination was given in 2007 with the first wave of accredited fellowship programs in 2008 [1, 2]. The field, in large part, was driven by a general recognition that a single team would be preferable in providing care for patients with life-threatening neurologic disease based upon the single "critical care" teams for surgical and medical patients [3], incorporating the nuances of imaging, interventions (e.g., fibrinolysis for acute ischemic stroke, reversal of coagulopathy for intracerebral hemorrhage), bedside monitoring [4], and medications that were uncommonly used in other critical care settings.

Leadership

Specialized care in the Neuro-ICU involves a complex, multidisciplinary team, involving physicians from specialties including neurocritical care, neurosurgery, endovascular surgery, and vascular neurology, advanced practice providers (APPs), pharmacists, nurses, and social workers. The leadership and structure of the Neuro-ICU team may vary institution to institution and over time. Even a single neurointensivist can improve outcomes at 3 months for patients with ischemic stroke and subarachnoid hemorrhage [5]. The improvement may outlast individual faculty, which may be attributed to

the introduction of multiple protocols, and close interaction between the neurointensivist and specialized nurses, who have also been instrumental to the development of many of these guidelines [6].

Communication

Communication skills help to link providers within teams, with other consulting services, and with patients and caregivers. Collaborative care may require interactions between wide-ranging specialties. The severity and unexpected nature of neurological illness confronting patients and caregivers lead to complex tasks for decision-makers in the ICU. Prognoses may be unclear and the long-term needs of neurological disability can be difficult to fathom. Within the team, proper communication and sign out can help to prevent and ameliorate medical errors.

Decision-Making

Among the typical Neuro-ICU diagnoses, less than 50 % of patients achieve functional independence by 12 months [7]. This complicates decision-making because caregivers must often speak on the patient's behalf, underscoring communication for the purpose of making decisions. Even when patients have made their wishes clear verbally or in writing, mapping these guidelines on to treatment decisions for specific medical conditions can be challenging [8]. Lack of preparedness is associated with worse outcomes for family members of people who pass away in the hospital, as are feelings of involvement or complicity in the decisions leading up to death [9, 10]. For patients who survive with disability requiring rehabilitation, caregivers are at risk for a variety of psychological and social difficulties [11, 12].

Leadership

Structure of the ICU and Neuro-ICU Team

Neuro-ICUs may take on many structural models, generally divided into "open" versus "closed" units. In open ICUs, individual providers may admit patients to the unit, often neurosurgeons or neurologists in the case of the Neuro-ICU, while in closed units, a single team acts as primary provider for all patients in the ICU; mixed models do exist, e.g., a co-attending approach allowing dual team leaders, or an ICU with an embedded providing team where other attending physicians admit and remain ultimate decision-making authority for patients [13]. Closed ICUs have the advantage of benefiting from embedded specialized providers who may be able to more efficiently enact guidelines and advancements in neurocritical care [14]. However, the requirements of maintaining specialized practitioners, including physicians and nurses, can tax a hospital with limited staffing [15, 16]. There are high-functioning Neuro-ICUs with both "open" and "closed" models, implying that local agreement may be more important that forcing the "correct" model. An "open" model that involves intensivists, even if they do not have ultimate decision-making authority, is typically enough to garner the benefits of intensivist staffing [3].

Advanced Practice Providers

As Neuro-ICUs are asked to care for more patients, advanced practice providers (APPs, e.g., advanced practice nurses, physician assistants) often play a larger role. A survey eliciting responses from approximately 10 % of Neurocritical Care Society members, of whom 58 % of responders were physicians, demonstrated overall positive views of APPs. The highest rates of satisfaction with the contributions of APPs were under the domains of responding to team member questions, responding to patient/family member questions, communication, and safety [17]. The primary predictors of positive views in all six domains of function measured were the presence and utilization of APPs.

Communication

Communication Between Intensivists and Surgeons

It is important to maximize harmony between the intensive care team and operative team. A recent survey of 912 neurovascular, vascular, and thoracic surgeons found that 43 % of surgeons reported frequent conflict with critical care physicians, 60 % with family members of patients, and 18 % with other surgeons. Substantial conflicts with intensivists ranged from neurosurgeons at 38 % to vascular surgeons at 47 %. Younger surgeons and those collaborating with closed ICUs had relatively higher rates of perceived conflict (odds ratios 2.5 and 1.7 respectively, $P < 0.001$ and $P = 0.005$). The most frequently reported sources of difficulties were communication about poor outcomes (64 %) and managing personal discomfort with poor outcomes (73 %) [18].

Insights into the nature of the conflict between intensivists and surgeons have been provided by ethnographic research: studies utilizing qualitative measures to explore the culture of the two fields. The two groups differentiate themselves through the symbolic boundaries of expertise, patient ownership, and decisional authority. While the two groups were found to have high levels of respect for one another, they each view themselves as having special knowledge and expertise. Some are generally accepted, such as the surgeons'

providence over "feeding, moving, and anti-coagulating," [19••] as well as direct surgical issues. Surgeons often relied on intensivists around communication issues such as discussing poor prognosis or complications [19••, 20]. This may be a reflection of surgeons' increased tendency to focus more solely on the ethical obligation of the physician's individual commitment to battle illness, while intensivists tend to act based on general allocation of resources and considerations of futility [21].

When they consulted each other openly, boundaries were decreased and the two groups had decreased conflict. When conflict arose, surgeons with high senses of patient ownership (often in post-operative patients) would attempt to limit both their own, and the patient's, time in the ICU, or attempt to "pull rank," while intensivists might appeal to guidelines or their authority to write all the orders in the ICU. Both teams seemed to express the feeling that it was the responsibility of the other to seek them out to discuss patients. Acknowledgement of each other's connection to the patient and areas of expertise, and open communication of each other's perspectives, aided by scheduled interdisciplinary rounds, were associated with improved relations.

Quality Improvement and Patient Safety

A recent study found that medical errors may be the third leading cause of death in the USA [22]. When identified, medical errors should prompt explorations in order to help prevent future, similar occurrences, generally through a root-cause analysis (RCA). This method, adapted from practices developed by NASA in the 1950s, is a process to identify factors that underlie variations in performance or led to an undesirable outcome with the goal to allow for development of strategies to correct these factors [23]. In order to best lead to positive and sustainable improvements, an RCA must be performed with a focus on culture and system practices, while avoiding a disciplinary perspective. Some tools to aid in this process include Ishikawa diagrams and the SWARM process [24, 25]. An Ishikawa diagram (also known as herringbone or fishbone diagrams) is a causal chart identifying contributing factors from such categories as people, methods, machines, and environments. SWARM is a 5-step formalized process of review involving a "swarm" of involved staff converging upon the site of the incident. The Joint Commission requires a credible RCA within 45 days of all sentinels or major adverse events [26].

When errors are discovered by an RCA, a quality improvement study can aid in their rectification. These differ from medical research, which attempts to gain new, generalizable knowledge, in that quality improvement studies explore the efficacy and implementation of accepted standards in a specific care setting. As such, they can often be performed more quickly and with fewer resources than traditional medical research [27]. The Society of Critical Care Medicine has published a guide to performing quality improvement research in the ICU [28]. The Committee on Advanced Subspecialty Training (CAST) of The Society of Neurological Surgery lists multiple requirements for patient safety in accredited programs including review processes for quality concerns [29].

Handoffs and communication of patient information within a complex, multi-disciplinary team are times of potential loss of crucial information, and have been explored as possible areas of improvement to prevent medical errors. The increased frequent of handoffs is an often cited concern related to regulations of training work hours [30, 31] Various tools have been developed to aid in handoffs in the ICU, including electronic medical record tools and formalized checklists. While there is no direct mortality benefit [32], these tools aid in consensus between care teams and overall positive user experiences without prolonging sign out time [33, 34].

Adverse outcomes should prompt RCAs and attempt to improve future quality of care. Communication of these events to patients and caregivers is an additional challenge. There is a large body of ethics and medico-legal writing on the topic of adverse event disclosure. While physicians are often concerned as to admission of culpability, the use of jargon or defensive posturing can lead patients to feel uninformed as to what has occurred [35]. In fact, many states have enacted "Apology Laws," which protect physicians from incrimination in malpractice lawsuits from statements of apology or condolences [36]. The "communication and resolution" approach involves clear and immediate disclosure of poor outcomes to families with apology and acceptance of responsibility, followed by expedited reviews for medical errors, and compensation for subsequent care when appropriate. With such initiatives, health systems have found 36 % decreases in claim frequencies and 32–59 % decreases in patient compensation costs [37, 38].

Palliative Care Consultation

A recent evaluation in the Neuro-ICU demonstrated palliative care needs in 62 % of admitted patients [39•]. These were primarily in the form of social support and goals of care decision-making needs. Screening alone was associated with increased documentation of family meetings from 22 to 35 % ($P = 0.019$) and trends of increased consultation with psychologist (from 4 to 8 %, $P = 0.186$) and palliative care specialist (5 to 11 %, $P = 0.056$).

Recent reviews found improvements in ICU utilization with early ethics and palliative care consultation [40, 41]. Palliative care needs can be identified by established clinical triggers associated with severe disease [42], or questionnaires of needs correlating with palliative care specialist competencies [39•]. These clinical triggers correlate highly with the hallmarks of Neuro-ICU illness, such as high levels of

neurological disability and diagnoses with median survival less than 6 months. Early consultation with ethics and palliative care specialists should be considered.

Decision-Making

History of Medical Decision-Making

Traditional practice from the early twentieth century focused on the physician's ability to make the wisest, most informed decision. In the 1970s, societal movements towards equality and human rights were reflected in case law elevating the primacy of personal autonomy and, eventually, the 1991 Patient Self-Determination Act, which directed that physicians cannot presume the authority of patients to direct their own medical care. The movement towards complete patient autonomy was checked by futility cases in the mid and later 1990s (such as Gilgunn v. MGH 1995) that placed limits on autonomy in the demands for potentially inappropriate care. Advancements in critical care have led to a resurgence of physician's expertise into the decision-making process [43, 44]. Throughout Europe, a continuum of decision-making from patient autonomy (more common in Northern Europe) to physician autonomy (Southern Europe) is still present [45, 46].

Shared decision-making

Shared decision-making is an attempt to integrate the knowledge of the physician with the values and autonomy of patients. Various methodologies to optimize and train this methodology have been introduced [7, 47–49]. The overarching principles remain; the two parties, physician, and patient, share information to achieve consensus. The physician provides understanding of the prognosis and treatment options while the patient provides their personal moral principles and goals [50, 51].

Accuracy of Surrogate Decision-Making

Despite best intentions, shared decision-making often deviates from a patient's stated wishes. In emergency Neuro-ICU admissions, the patient is generally represented by one or many surrogate decision-makers, typically a caregiver. The application of communicated patient wishes, even when codified in a living will, can be difficult to apply to specific medical situations [52], and have been shown to be less than ideal markers of patients' true wishes [53]. Reliance on surrogates for decision-making can be psychologically harmful to those taking on this role [54, 55].

Even when the patient's attitudes are known, this information may not lead to clear understanding of their choices. Hemicraniectomy in hemispheric cerebral infarction may be taken as a prototypical difficult neurocritical care decision. In a study explaining the prognosis of this surgery to healthy volunteers, no correlation was found between individuals' stated highest acceptable level of disability they would be "willing to live with" and their preferences on receiving decompressive surgery [56]. This underscores that a high likelihood of disability may not predict decision-making preferences.

The diagnosis and sequelae of brain death are frequently problematic. While brain death is considered definitive in 48 US states (two permit insistence upon cardiovascular death), with up to half of family members not understanding the irreversible nature of the diagnosis [57]. Inclusion of the family members and allowing them to witness the brain death evaluation can significantly improve their understanding [58].

Communication Training

Multiple educational models have been developed to improve communication skills of intensivists at the single hospital, multi-hospital and system-wide levels. These include educational materials and increased time or rounds with palliative care physicians [40], and have generally focused on medical and general surgical ICU settings. Training in surgical ICU residents has been demonstrated to lead to a dramatic reduction in ICU days for patients who died in the ICU, from 27.8 to 15.7, without an overall increase in mortality [59]. A structured educational program was provided to 12 hospital ICUs in the Seattle area, including communication skills by palliative physicians along with supervisory support and additional education in role-modeling for individual "local champions" at each site. The early evaluation of data demonstrated a reduction in the median length of stay from 3.9 to 3.1 days post-intervention ($P < 0.01$) [60].

Systematic reviews of ICU communication and palliative care interventions have been performed [40, 41]. Putting structures in place to encourage family meetings do indeed increase the likelihood that they take place, although they may not, by themselves, change the rate of do-not-resuscitate status or withdrawal of life support.

Communication with Caregivers

Caregiver burden of the family members of survivors of critical care and stroke have received increasing attention. One study followed psychological outcomes of caregivers with utilization of structured family meetings and bereavement brochures [61••] utilizing the VALUE system: to *Value* what caregivers said, to *Acknowledge* their emotions, to *Listen*, to ask questions that would allow caregivers to *Understand* who the patient was as a person, and to *Elicit* questions from the caregivers [62–64]. One hundred twenty-six family members of

ICU patients deemed likely to die in the next few days were randomized to treatment as usual versus structured meeting with bereavement brochures and interviewed by phone at 90 days. Anxiety and depression scores ($P = 0.004$) and the incidence of post-traumatic stress disorder (PTSD) ($P = 0.01$) were reduced [61••]. Caregiver distress can also be screened by a brief questionnaire after death in the ICU [65]. There are case discussions specifically tailored to the Neuro-ICU [49, 66], which can be used as educational materials.

Shared Decision-Making Through Meetings

The framing of a family meeting alone has been demonstrated to affect decision outcomes [67]. The physician must therefore understand the effect that they have on surrogate decision-making, even when attempting to be neutral. As complete neutrality and reliance on decision-makers is difficult, a physician may choose to express his or her own preferences or decision pathways, which has been found to not alone overwhelm autonomy [68]. Caregivers have expressed an array of desired involvement in decision-making from complete reliance on the physician to complete control, and discordance between desires and their actual role was associated with a higher rate of PTSD ($P = 0.005$) [69]. Medical ethicists continue to argue the best principles by which to guide this influence [70].

Prevention of Patient Traumatic Responses

Much of the exploration into communication in the ICU has focused on caregivers as patients may be unable to engage directly with ICU staff while admitted due to intubation or illness. One in four ICU survivors experiences symptoms of post-traumatic stress disorder (PTSD) by the Impact of Events Rating Scale [71]. ICU diaries, which are logs of the ICU experience written by ICU staff and, at times, with contribution by caregivers, were intended to allow patients fuller understanding of their own ICU course. Use of ICU diaries led to a decrease in patient PTSD symptoms ($P = 0.02$) in patients intubated in the ICU who later recovered cognitive functions [72]. Furthermore, use of benzodiazepines and deeper sedation goals in the ICU were associated with development of PTSD symptoms [71, 73], supporting efforts to minimize sedation where appropriate.

Communicating Prognosis

Prognostication is important to communication, but current models are inadequate and inaccurate regardless of the level of experience of the physician. One study of junior neurointensivist prognosis demonstrated an overall accuracy of approximately 80 % with a significant bias towards predicting negative outcomes [74]. Senior intensivists may be even more pessimistic [75].

Very poor early prognosis can lead to do-not-resuscitate/do-not-intubate (DNR/DNI) orders or even withdrawal of life support. [76] This can lead to a self-fulfilling prophecy, confirming the physician's prediction of a poor outcome [77]. "Good outcome" after intracerebral hemorrhage, defined as independence for ambulation, is more likely in patients who were not provided DNR orders than those for whom a DNR order was placed, independent of other factors [78].

An increasing number of prognostic tools are being developed for neurocritical illness [7], with the potential to be more accurate than individual, expert opinion [79]. Many of these are also reliant on data subject to the above described early-diagnosis bias [80]. Avoidance of difficult or uncertain information is a clear limitation to the physician-patient relationship [81]. Fuzzy or nonspecific information can be seen as a common defense of physicians to the difficulties of the family meeting [82]. However, decision-makers benefit from clear and direct communication, even if that is communication of uncertainty [83].

Future Directions

The Patient Protection and Affordable Care Act of 2010 encourages shared decision-making and, potentially, the linking of reimbursement to its utilization. It can be difficult to objectively identify and track utilization of shared decision-making techniques. Decision aids, patient information tools, such as pamphlets or web pages, which inform patients about treatment options and help them to choose between available choices, can be used as tangible markers of shared decision-making. They have been supported by a recent Cochrane Review [84] and called for in the Neuro-ICU [85], although decision aids specific to the Neuro-ICU have yet to be fully developed. We can expect these to become a greater part of family communication in the Neuro-ICU. However, their linkage to financial incentives carries the risk of encouraging their use without true collaboration efforts [48].

Dedicated protocols, training materials, and other tools may be developed in order to improve communication skills in the Neuro-ICU. These could include further structures for family meetings, communication of prognosis, and interactions between services. It is not always clear which outcome measures are most germane to communication strategies and should be used to best evaluate the efficacy of these tools. PTSD symptoms are often identified as the primary psychological outcome for patients and caregivers, and this may be evaluated by a number of questionnaires, and alternative forms of depression and anxiety have also been evaluated. The understanding of some of these psychiatric disorders (e.g. PTSD symptoms, major depressive disorder, generalized

anxiety disorder) were not developed in reactions to ICU care, and further work should be done to clarify what markers are most appropriate after the Neuro-ICU. Similarly, more robust research related to clinical outcomes in Neuro-ICU patients will allow for improved prognostication and clearer discussion of outcomes with decision makers.

Conclusions

Care in the Neuro-ICU involves a multidisciplinary approach to ever-advancing modalities of medical monitoring and interventions, requiring interactions not only within a team but also in association with associated medical services and, ultimately, with patients and caregivers. Leadership skills are crucial for the team to function optimally. A focus on communication helps to maintain the delivery of informed and compassionate care to patients and their caregivers, as well as proving support to help them make informed decisions with a minimum of psychological trauma.

Compliance with Ethical Standards

Conflict of Interest Stephen Trevick and Minjee Kim declare that they have no conflict of interest.

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