



## Reducing Non-Beneficial Renal Replacement Therapy in the ICU: Teaching Fellows to Negotiate a Time-Limited Trial

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### Abstract

**Background:** Acute kidney injury (AKI) carries a high mortality among patients treated in the intensive care unit (ICU). Continuous renal replacement therapy (CRRT) is used to treat complications of AKI, but it is often initiated in patients who have little hope of surviving.

**Objective:** The authors sought to teach nephrology and pulmonary fellows how to utilize a time-limited trial strategy when discussing CRRT.

**Methods:** In March 2014, the authors implemented a two-phase training initiative for pulmonary and nephrology fellows that included a didactic session and a simulated surrogate encounter. The didactic session provided clinical knowledge and communication skills training necessary to lead end-of-life discussions with surrogates, including how to introduce a time-limited trial. The simulated encounter involved a 20 minute interaction with a professional actor playing the role of a surrogate decision maker. Fellows completed pre and post-encounter surveys assessing self-reported knowledge and communication skills.

**Results:** All seven nephrology fellows and 11 of 13 total pulmonary fellows completed the didactic sessions and simulation encounter. Prior to the simulation encounter, only 1 (14%) nephrology and 6 (54%) pulmonary fellows reported "good" or "excellent" communication skills. After the encounter, there was a significant improvement in self-reported communication skills for nephrology fellows (p-value 0.04).

**Conclusion:** This training initiative proved to be an effective tool to improve communication skills needed for discussion of a time-limited trial strategy when discussing CRRT with surrogates. The authors will provide similar training to future fellows in order encourage responsible use of CRRT in the ICU.

### List of Abbreviations

AKI: Acute Kidney Injury, ICU: Intensive-Care Unit, RRT: Renal Replacement Therapy, CRRT: Continuous Renal Replacement Therapy, IHD: Intermittent Hemodialysis, APACHE: Acute Physiology and Chronic Health Evaluation IV

### Introduction

Acute kidney injury (AKI) is a common complication among those admitted to the medical intensive care unit (ICU) where more than 50% of patients develop kidney injury [1]. This diagnosis carries a very high mortality with recent data suggesting that in-hospital mortality may be as high as 60% [2].

Patients with severe AKI often exhibit complications necessitating the initiation of renal replacement therapy (RRT). Many of these patients cannot receive conventional hemodialysis because of hemodynamic instability. Instead, they are started on continuous renal replacement therapy (CRRT), which provides the benefits of conventional intermittent hemodialysis (IHD) without a substantial drop in blood pressure.

While CRRT is commonly initiated to correct life-threatening complications, no study of CRRT has documented a mortality benefit. Because some patients requiring CRRT have chronic, terminal conditions underlying their acute illness, the outcome of their disease course will not be significantly modified by CRRT. For many of these patients, CRRT is a non-beneficial intervention that will not appreciably affect long-term survival and may act only to burden the patient and further strain the healthcare delivery system from a cost and resources perspective decisions to limit therapeutic interventions in these cases require thoughtful discussions with a patient-centered focus, ultimately leading to shared decision-making between providers and patients or their surrogates. In academic medical centers it is not uncommon for trainees, especially subspecialty fellows, to lead such discussions. Many do so with little or no training in goals of care conversations, and even fewer have experience discussing such high-stakes, complicated treatment plans [3]. We set out to improve fellows' communication skills in these situations through a novel simulated experience that integrated discussion of CRRT in the context of broader goals of care. Our objectives were twofold: 1) to identify patients unlikely to benefit from CRRT in the ICU, and 2) to provide fellows with alternative strategies for discussing CRRT initiation in unstable clinical situations.

**Table 1:** MICU patients with an APACHE score receiving CRRT from 7/2011-6/2012.

	Did not survive to hospital discharge	Survived to hospital discharge
APACHE predicted mortality > 80%	12	11
APACHE predicted mortality < 80%	21	22

MICU patients with an APACHE score receiving a nephrology consult from 1/2012-12/2012.

	Did not survive to hospital discharge	Survived to hospital discharge
APACHE predicted mortality > 80%	12	11
APACHE predicted mortality < 80%	68	100

## Methods

This initiative was undertaken as part of Northwestern University's Academy for Quality and Safety Improvement, which selected multidisciplinary teams of clinicians to train in the DMAIC method of quality improvement (Define, Measure, Analyze, Intervene, Control) and then perform a quality improvement (QI) project. Analysis of de-identified data obtained during this project was deemed by Northwestern University's Institutional Review Board to be exempt from review.

### Measurement and analysis

In an attempt to measure and analyze the extent of use of non-beneficial CRRT in the ICU, we explored the incidence and outcomes of patients receiving CRRT. We compared actual mortality of these patients with mortality predicted by the Acute Physiology and Chronic Health Evaluation IV score (APACHE). If predictive, then APACHE could be used as a screening tool to select patients who likely would not benefit from CRRT. We used a predictive mortality of 80% as a cutoff for a "positive" screening. In other words, if a patient requiring CRRT had an estimated 80% mortality, the patient or their surrogate might be approached for a discussion about limiting or not initiating CRRT.

APACHE scores were calculated using Northwestern's Enterprise Data Warehouse. Through chart review we calculated the sensitivity and specificity of the APACHE score cutoff (> 80% predicted mortality) for patients receiving CRRT. During academic year 2011-2012, 76 patients received CRRT in the medical ICU; 66 of them had available APACHE scores. An APACHE predicted mortality of 80% had a sensitivity of 36% and specificity of 67% for predicting hospital mortality. Positive and negative predictive values were 52% and 51% respectively. As a result, APACHE could not be used as a screening tool to select patients with AKI unlikely to survive to hospital discharge. Predicted and actual mortality for this cohort are displayed in [table 1](#).

### Intervention

Our intervention needed to account for the poor predictive value of our screening tool. Because prognosis for these patients was still generally poor, we designed a simulated training experience that focused on time-limited trials of CRRT. Recommending a time-limited trial places CRRT in the context of the broader treatment goals and avoids the suggestion that CRRT will have no benefit. This approach has been endorsed in a joint clinical practice guideline published by the Renal Physicians Association and the American Society of Nephrology [4].

We assessed the feasibility of a training intervention with seven nephrology fellows and eleven fellows in pulmonary and critical care. Training consisted of 1) a didactic educational session, and 2) a simulation with a standardized surrogate of a patient for whom CRRT was being considered.

The didactic session provided both clinical knowledge and communication strategies needed to lead end-of-life discussions. The 90-minute session was facilitated by the Chair of the hospital ethics committee and the Director of the CRRT program (an

attending nephrologist). These facilitators provided a review of published literature regarding the prognosis of AKI and the indications for and outcomes of CRRT. Possible treatment options for AKI were discussed including IHD, CRRT, a time-limited trial of CRRT or non- initiation of RRT. This final option was explored in detail, highlighting well-defined situations in which RRT should be discouraged. Subsequently, the facilitators provided a structured framework for conducting difficult conversations, particularly in critically-ill patients or end-of-life situations ([Supplementary file 1](#)) [5]. This communications skills training included strategies for conflict resolution in situations in which a surrogate decision-maker and the treating physician disagree about limiting therapies such as CRRT. One such strategy, a time limited trial, was encouraged because it satisfies surrogates' desire for aggressive care but calls for reevaluation of the treatment's effectiveness at regular intervals. The time-limited trial strategy has been previously described by Quill and Holloway [6]. During the didactic session, the steps to successfully instituting a time-limited trial for RRT in the critically-ill were discussed in detail ([Supplementary file 2](#)).

Two weeks following the didactic experience, fellows were scheduled for a simulated encounter with a standardized surrogate. Encounters occurred in Northwestern's simulation center, which was capable of video recording each fellow's simulation. The surrogate role was played by a professional actor who had extensive experience with end-of-life conversation simulations.

Prior to the simulation session, fellows were given a brief survey to assess their self-reported knowledge and communication skills regarding end-of-life discussions. As an introduction to the simulation, the fellows were informed that the patient's brother, a former registered nurse, wanted to talk to a doctor about the patient's condition and treatment options for the patient's worsening AKI ([Appendix 1](#)). The fellow was instructed to use knowledge gained from the didactic experience in order to arrive at a treatment plan agreeable to the surrogate. Upon entering the room, the surrogate actor asked the fellow when dialysis would be started. The surrogate actor was given instructions to respond to the verbal and nonverbal cues of the fellow when negotiating a treatment plan. He engaged the fellow without preference for any particular treatment plan.

The simulated encounters lasted approximately 20 minutes and were observed by the chair of the hospital ethics committee and the nephrology attending. Following the simulation, the participant received feedback from the surrogate (actor) and both physician facilitators. Specifically, each fellow received feedback regarding body language, choice of words, and suggestions of how to more effectively navigate aggressive or emotional points in the conversation. The surrogate provided feedback on demeanor, compassion, and responsiveness. Fellows then completed a post-simulation survey assessing self-reported knowledge and communication skills. Each received the video recording of the encounter on a compact disc so that they could review and critically evaluate their performance. Pre and post-encounter survey results were analyzed using a McNemar's paired t-test and significance was determined as p-value of 0.05 or less.

## Results

All 7 nephrology fellows and 11 of 13 total pulmonary fellows completed didactic sessions and simulated encounters (remaining 2 fellows unavailable due to vacation). Prior to the simulation encounter, only 1 (14%) nephrology fellow reported that their communication skill set for leading these types of discussions were "good" or "excellent" (score of 4 or 5 on a 5-point scale) ([Table 2](#)). Following the intervention, 7 (100%) of nephrology fellows reported "good" or "excellent" communication skills, a significant improvement (p-value 0.04). Among the pulmonary fellows, 6 (55%) described "good" or "excellent" communication skills prior to the simulation exercise, which increased to 7 (64%) in the post-encounter questionnaire (p-value 0.62). Self-assessment of fellows' knowledge base in leading such discussions demonstrated a similar trend. After completing the

**Table 2:** Pre and post-encounter self-assessment of communication skills.

Statements	% Responding as Good or Excellent (score of 4 or 5)			
	Nephrology Pre	Nephrology Post	Pulmonary Pre	Pulmonary Post
<i>I would assess my skill set to successfully lead such a discussion as...</i>	14.2	100*	54.5	63.6
<i>I would assess my knowledge base to successfully lead such a discussion as...</i>	0	85.7*	45.5	63.6

\*p-value &lt; 0.05

didactic and simulation sessions, all 7 (100%) nephrology fellows agreed that this simulation training should be a required component of fellowship education and 10 (91%) pulmonary fellows indicated they would recommend this training experience be continued for future fellows.

## Discussion

A substantial portion of training for nephrology and pulmonary fellows is spent in the care of critically-ill patients with AKI, many of whom undergo initiation of CRRT despite extremely poor prognoses. National surveys have demonstrated that many fellows do not feel prepared to have the difficult conversations that are necessary to guide decisions regarding CRRT in the ICU setting [7]. Communication skills training programs comprised of didactic sessions followed by standardized patient encounters have been incorporated successfully in other fellowship programs with prevalent end-of-life issues, namely oncology and geriatrics, but have only recently been utilized in nephrology and critical-care training [8]. Here we demonstrate a self reported improvement in communication skills required to successfully facilitate initiation of time-limited trials of CRRT. The higher assessment of baseline knowledge and skills for the pulmonary fellows compared to the nephrology fellows may reflect more experience with goals-of-care discussions related to mechanical ventilation and resuscitation efforts in the intensive care setting. In addition, pulmonary fellows at our institution complete a rotation on the palliative care inpatient service which also provides them with increased exposure to difficult end-of-life discussions and practice in shared-decision making. However, the increase in self-reported knowledge and skills for both sets of fellows post-encounter suggests a role for simulation-based training specifically geared towards discussions of time-limited CRRT trials.

Furthermore, this initiative confirmed that even well validated mortality prediction tools may not be applicable to specific ICU populations. For this reason, emphasizing a time-limited trial of CRRT is a good strategy as it recognizes the difficulty in predicting benefit of therapy and promotes responsible use of expensive resources. There may be benefits beyond cost savings, such as augmenting trust between surrogates and the care team and facilitating better communication through more frequent family meetings.

Limitations of our study include its design as a feasibility study, small number of fellows undergoing training, and self-reported outcomes. In the future, we plan to strengthen our approach by assessing true competency and mastery of these communication skills using experienced observers with validated checklists.

In order to maintain the effectiveness of our intervention over time, we plan to continue this training program for incoming nephrology and pulmonary fellows. Fellows will also repeat the training in subsequent years to provide a “booster” opportunity. We hope that repeated exposure to communication strategy education and practice will foster a culture of empathic, patient-focused ICU care as well as responsibility in resource utilization.

## Conclusion

To our knowledge, this is the first fellow training program in a communication strategy that emphasizes the importance of time-limited trials for CRRT in the ICU. By training our fellows in this guideline-supported approach, we will maximize the benefit of this therapy by limiting its prolonged use in patients who continue to decompensate despite aggressive ICU care.

## Ethical Approval

Analysis of quality improvement data was deemed exempt from institutional review board review by the Northwestern University IRB on 9/9/2014.

## References

- Mandelbaum T, Scott DJ, Lee J, Mark RG, Malhotra A, et al. (2011) Outcome of critically ill patients with acute kidney injury using the Acute Kidney Injury Network criteria. *Crit Care Med* 39: 2659-2664.
- Uchino S, Kellum JA, Bellomo R, Doig GS, Morimatsu H, et al. (2005) Acute renal failure in critically ill patients: a multinational, multicenter study. *JAMA* 294: 813-818.
- Sullivan AM, Lakoma MD, Block SD (2003) The status of medical education in end-of-life care: a national report. *J Gen Intern Med* 18: 685-695.
- Moss AH (2010) Revised dialysis clinical practice guideline promotes more informed decision-making. *Clin J Am Soc Neph* 5: 2380-2383.
- Szmulowicz E, Neely KJ, Sharma RK, Cohen ER, McGaghie WC, et al. (2012) Improving residents' code status discussion skills: a randomized trial. *J Pall Med* 15: 768-774.
- Quill TE, Holloway R (2011) Time-limited trials near the end of life. *JAMA* 306: 1483-1484.
- Holley JL, Carmody SS, Moss AH, Sullivan AM, Cohen LM, et al. (2003) The need for end-of-life care training in nephrology: national survey results of nephrology fellows. *Am J Kidney Dis* 42: 813-820.
- Schell JO, Green JA, Tulsy JA, Arnold RM (2013) Communication skills training for dialysis decision-making and end-of-life care in nephrology. *Clin J Am Soc Neph* 8: 675-680.

## Appendix 1

**Clinical scenario used for simulated patient encounter:** A previously healthy 50 year-old-woman who, one month earlier, was admitted to the hospital with pneumonia that progressed to septic shock. Ultimately the patient sustained cardiac arrest that

resulted in AKI and hypoxic encephalopathy. During management of the patient's illness, lesions were discovered in the patient's lungs and lymph nodes, and the patient was diagnosed with metastatic melanoma. Oncology consultation revealed few available treatment options and a poor prognosis for the melanoma, independent of the patient's acute illness.

**Supplementary file 1:** Communication Skills Training: Core steps to guide difficult conversations.

Communication Skills Core Steps
<b>Opening the Conversation</b>
1. Introduces the conversation (including why it is important and what will be covered)
2. Inquires about previous experience with goals of care conversations (including exploration of positive or negative reactions)
3. Asks about decision-making preferences (including how the patient and/or family prefer to make medical decisions, how much information they would like)
4. Makes an attempt to know the patient "as a person" (for example, "tell me more about you" or "what should I know about your loved one as a person?")
<b>Exploring and Clarifying Goals and Values</b>
1. Assesses proxy/patient's understanding of his/her current condition (i.e., what's happening now?)
2. Assesses proxy/patient's understanding of his/her prognosis (i.e., what will happen?)
3. Provides or Clarifies Information about current state and/or prognosis, and benefits/burdens/risks of dialysis
4. Inquires about patient's hopes and/or concerns for the future
<b>Closing the Conversation</b>
1. Summarizes or reflects upon what the patient/proxy has said
2. Asks permission to make a recommendation about a plan of care
3. Makes a recommendation about a plan of care that is consistent with the patient's goals and values
4. Asks a confirmatory statement after making a recommendation (e.g., "how does that sound to you?") and includes exploration of reactions, should patient have a strong reaction to the statement

**Supplementary file 2:** Steps to Negotiating a Time-Limited Trial for RRT in Critically-Ill.

<b>Step 1:</b> Physician provides a clear and unified description of the patient's medical condition and prognosis, to the extent this is possible.
<b>Step 2:</b> Physician clarifies the goals and priorities of the patient through discussion with the surrogate-decision maker.
<b>Step 3:</b> Physician identifies appropriate markers that would suggest improvement in the patient's condition, which may include the following: <ul style="list-style-type: none"> <li>- Increase in urine production</li> <li>- Improvement in oxygenation</li> <li>- Decreased vasopressor requirement</li> <li>- Improvement in mental status</li> </ul>
<b>Step 4:</b> Physician and surrogate choose an appropriate timeframe for re-evaluation, usually within 3-10 days of CRRT initiation.
<b>Step 5:</b> Physician and surrogate define potential actions that can be taken at the end of the time-limited trial. Examples include: <ul style="list-style-type: none"> <li>- Discontinuation of CRRT</li> <li>- Limitation of other life-sustaining treatments</li> <li>- Continuation of full life-support until another defined timeframe for re-evaluation</li> </ul>