



Keeping Kidney Patients Safe

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Ensuring Safety in the Dialysis Realm

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Category: Full spectrum patient safety improvement project

Type of Facility: Outpatient (3 clinics)

Number of Patients: >90 patients

Number of Nephrologists: 6

Background

For several years, our safety team has been researching best practices and searching for anything we could realistically adapt to reduce safety failures in our dialysis microcosm. Our analysis led us to the realization that we were much less safe than what we thought despite repeat perfect CMS safety surveys. The physicians were observing repeated safety failures that were not being recognized or reported for performance improvement purposes. Termed Missed Incidences of Signals of Safety Explored in Dialysis (MISSED) [see associated section of PowerPoint], it was recognition of failure in monitoring and correcting at the point of care.

To correct this, the medical director reviewed every lab and order for over a year to help catch the inconsistencies, signals of safety missed, and to develop methods to reliably mitigate safety problems. He even reviewed post dialysis emergency room labs and encounters to help detect what went wrong and if there were systems that failed that could be improved.

The environmental survey and gap analysis yielded the following findings:

- 1) Set and forget attitudes with waiting for failure to respond—waiting for machine alarms to react to patient status. RNs were assessing before and after and might only visit during to administer medications or respond to problems.
- 2) Lack of direction for safety limits including boundaries for safe care such as ultrafiltration rate limits, medication limits for ESAs, heparin, etc. Technicians were handling things by traditional routine react and respond. Lack of incident recognition, recording and trending wrongfully suggested uneventful dialysis.
- 3) Lack of simple visual reminders, escalation protocols, and inconsistent escalation efforts.

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- 4) Lack of developing good ingrained habits for detailed systematic approaches to patient safety at the chair side.
- 5) Repeat failure episodes occurred due to lack of effective problem solving and resolution assurance. There was a lack of follow-up from post dialysis events, procedures and diagnostic tests.
- 6) Failure to consistently deliver/execute prescriptions as intended by the prescriber: lack of attention to detail as well as adjustments to machines were made on a whim by staff and patients.
- 7) Knee-jerk antibiotic usage was rampant and not necessary and occurred without MD notification and without follow-up.
- 8) Rescue saline administration was out of proportion to reported events.
- 9) Blood loss episodes of care: lost setups and post venipuncture bleeding episodes as well as post dialysis episodes of care for emergency room visits were common; there was a lack of monitoring and escalating concerns for at risk bleeding patients with multiple blood thinners or those exhibiting easy bruising and bleeding.
- 10) The perception of “safe in dialysis” was not realistic for staff nor consistent with the perceptions by the patients they were serving.
- 11) Referrals for hemodialysis access were delayed until an MD rounded instead of being instituted prior to acceptance to facility or upon each encounter.
- 12) Catheter removal was often not a priority even after an infection occurred; attempts at treating through infections often lasted weeks. Some staff cut corners with access cleaning methods.
- 13) Transient care and on-call coverage decisions were inconsistent and often not reported to attending of record. There was no easily viewable longitudinal charting of an active patient specific “to do list” for MD to review at the time of patient encounter, or to inform MD of outstanding issues and unresolved problems.
- 14) Assessing care post return to dialysis was inconsistent. Patients returning from hospitals and encounters were often volume overloaded and required extra dialysis time and sessions within first week of return from those transitions.
- 15) Advanced directives resuscitation discussions were inconsistent and not being delivered as often as needed especially for those patients with declining status.
- 16) Admission of patients without medical director review led to inappropriate in-center high acuity patients that could not safely be cared for in those settings—and which potentially compromised others’ care with redirection of staff for higher care attention needs and with infectious risks.



- 17) Manual transfer of handwritten treatment sheets to electronic documentation resulted in transcription errors, compounding in failures when treating staff did not recognize that post dialysis weights were incorrectly entered and not detected.
- 18) Access complications and other episodes of care were being directed by “autopilot” protocols to emergency rooms and interventional suites without MD involvement, which led to delayed definitive access care and catheter prevention strategies.
- 19) Knee-jerk protocols and orders that were given by cross coverage MDs directed the changing of dialysate baths without consideration of lab errors or inconsistent lab results from usual patient labs. This commonly resulted in incorrect management. Ramping of bicarbonate was done without MD involvement.
- 20) Timely recognition and escalation of signals of safety were problematic.

We found that there is insufficient training in safety for the dialysis team as compared to what is offered routinely by other industries.

Policies and Activities Implemented

As a result of many identified safety failures, our improvement plan attacked multiple fronts simultaneously, which precluded our ability to single out the one magic bullet hitting everyone’s bulls-eye for safety.

We started out identifying several goals, which rapidly expanded.

- 1) Reduce the harm in hemodialysis including intradialytic morbid events
- 2) Improve experience of patients during and after hemodialysis by preventing the shock-and-awe of therapies
- 3) Simplify prescriptions
- 4) Consolidate protocols
- 5) Re-educate staff
- 6) Set safety limits and boundaries for all aspects of care and ingrain the staff in these principles of safe boundaries of care
- 7) Prevent knee-jerk reactions
- 8) Reduce the distractions and improve the focus on patients
- 9) Improve the all hands on deck approach during shift transitions
- 10) Improve communication within the clinic and beyond to outside encounters of care



- 11) Reduce falls with the buddy system for escorting patients to and from the station
- 12) Reduce catheters and mitigate infection risks for button hole technique with extra steps of disinfection
- 13) Consolidate medications and reduce polypharmacy

There was resistance to the change. We started what seemed at first as our mission impossible with an emphasis on changing the philosophy from a traditional reactive to proactive care approach.

We spoke with every patient and physician to explain Safety Assessment & Assurance from Everyone Treating You (SAFETY) [see associated section of PowerPoint] so that patients could understand what is expected from them as well as from others. We may have had one or two patients in all who transitioned to other clinics as a result of our inability to reach mutual realistic goals of therapy with the emphasis on safety.

We took the following actions:

- 1) Change to vitals every 15 minutes and specific direction regarding early recognition of impending doom including changes of vitals suggesting hemodynamic collapse. Since the machines do not have adequate biofeedback reductions in ultrafiltration and BFR, we had to pay closer attention to manually address these situations to prevent ischemic harm to patients. Our lengthening of time on dialysis allowed us flexibility in reducing blood flow rates (BFRs).
- 2) No longer were technicians allowed to do anything but focus completely on patients; and they had to always be present on floor directly engaged with patients rather than performing non-direct patient care activities.

Recognizing impending doom was taught to staff so they could act as early flares for escalation. A systematic approach was emphasized.

Focus(on the patient and the task at hand)

Look/Listen (look at patient and station--not just the access-- then hone in on the details; listen to patients as they breathe and as they speak including what they are saying with their words and expressions)

Acknowledge (the needs and complaints for symptom/sign improvement and resolution)

Review/Record (review the prescription to ensure that it is being delivered as intended; review trending hemodynamics for safety parameters set by medical director or prescriber and record the review)

Escalate as appropriate

Signal to patient with an empathetic kind smile; and if all ok a thumbs up; and sign document/electronic signature of safety rounds

- 3) Changed to longer day shifts with same staff seeing the patients for continuity. Where this was not possible, we required the nurse manager to make rounds each shift and be more available on floor in supervisory roles for a better continuity of care approach.



- 4) Engaged patients to be cognizant of their prescriptions, machine settings, notify for changes, and to monitor as neighborhood watch for their neighbors on dialysis. Developed the tagline - Priority in Patient Engagement for Safety: Be Smart, Do Your Part Educational Program - a description for our MD to emphasize the patient role in care and safety.
- 5) The MDs agreed to simplify prescriptions, pro re nata orders, and standing orders to mitigate the mistakes resulting from staff confusion. We simplified orders with a Simplification of Prescription over Time (SPOT-On) approach [see associated section of PowerPoint].
- 6) Transitioned as many patients to home therapies as safely possible. This was one of the most beneficial and mutually rewarding outcomes.
- 7) Reduced information sharing gaps including medication reconciliation, transitions in care, and other encounters or episodes of care.
- 8) Consolidated formulary for antibiotics, dialysates, and dialyzers. Too many choices led to confusion, errors, as well as lost revenue from expired products. We found that the larger dialyzers led to misperceptions for use and unfortunately ended up shortening time—which led to more episodes of care for intradialytic morbid events and ECV fluid accumulation.
- 9) Pushed for email catheter alerts, which improved team awareness for prompting MDs to reduce catheters.
- 10) Emphasis on retraining staff to review the laboratory and hemodynamic trends for changes that might suggest impending problems. We are currently working on expanding the laboratory and IT automated prescriber electronic preference alerts to help mitigate missed signals of safety.
- 11) Standing orders for hospitals, transitions in care, and discharges were available to MDs to mitigate failures resulting from transitions in care. Coordination with hospitals helped the acute programs understand about bidirectional information sharing to mitigate harm to patients.
- 12) ASURE-CARE: Assess Status Upon Return from Episodes of Care—left up to the RN to make sure dry weights are immediately addressed (expected weight loss) and what other transition information is necessary for the baton handoff to be successful including antibiotics continuation.
- 13) Limits/boundaries—the MDs agreed to: maximum of UF rates, BF rates, DF rates, dialyzer size; minimum K+; bicarbonate, sodium, dialysate temperature, use of ultrafiltration only therapies and restricted use of variance modeling profiles.
- 14) Ticklers were directed each treatment sheet and carried over for caution in care.



- 15) Communication during transitions was improved by sending a treatment sheet with dialysis prescription, medications, and caution in care ticklers to the areas of encounter. Patients are educated to always call us at the time of a new prescription and remind us when presenting to the clinic for updates in care, encounters, etc. If patients are admitted to a hospital, they are to call and ask the clinic to participate in the coordination of care. We coordinated with local emergency rooms to fax encounter notes at the time of discharge.
- 16) Solicited P&Ps and protocols from others and modified them to fit our particular circumstances. [sample policies available – would link to cramps and hypotension policies]
- 17) Began replacing oral bicarbonate and instituting daily stool softener treatments, which resulted in more consistency for uremic acidosis and potassium management and ultimately resulted in better clinical tolerance perception for patients.
- 18) Reduced use of medications that are known to interfere with dialysis clinical tolerance including nitrates.
- 19) Receive adverse event, incident or near miss reports electronically in a timely fashion; trained what is considered a near miss or event for escalating and reporting.
- 20) Emphasized quarterly reports listing those patients who did not have directives declared and those who were in need of urgent MD intervention.

Outcomes and Insights

Through this experience, we learned several key lessons:

- 1) The most important aspects of effective safety programs are medical director engagement, patient and entire team buy-in. Anyone advising patients against a safety approach undermines the critical trust relationship valued amongst the provider, prescriber and patient.
 - a. Refusal by patients and prescribers is not an adequate excuse to neglect discussing the important safety issue at a different time with a different approach.
 - b. Share your insights for others to benefit even if it means sharing with ESRD networks.
 - c. The excuse of waiting for hard evidence to make patients safer has resulted in too little progress in mitigating repeat harm to patients.
 - d. Learn from patient experiences including those outside of the facility that are affected by what we do in dialysis. The care of these patients must be viewed more comprehensively than the traditional window in time at the facility approach.
 - e. Consider patient safety as the priority in every treatment for the entire treatment and beyond—listen well to their side of it all.
- 2) Safe limits, boundaries, parameters, and escalation protocols are difficult to set and adhere without all prescribers in the clinic working well together. P&Ps that are well crafted do nothing if they sit on shelves waiting for surveys, and are not practiced routinely like emergency or disaster plans.



- 3) Duration of dialysis sessions, optimal volume management (dry weight management), dialysate bath concentration limits, and ultrafiltration limits are three of the most important aspects of daily dialysis patient safety.
 - a. Watch closely for need to perform extra dialysis sessions and lengthen times for a handful of patients who refuse to restrict their interdialytic weight gains.
 - b. With higher solute mass transfer rates with higher BFR settings, larger and more efficient dialyzers, higher UFR, higher DFR, and higher bicarbonate and lower magnesium, calcium and potassium, expect that lower sodium dialysate baths may require adjusting time along with other considerations to avoid patient clinical intolerance.
 - c. Kt/V and URR are misleading surrogates that can lead to knee-jerk reactions and incorrect advice from staff.
- 4) Checklists are great. However, too much information overload distracts staff. The lists must be succinct, and prompt staff at the point of care to remind them of the critical thought processes. Our safety checks started out with longer lists to train staff akin to training children how to perform long division first.
- 5) Catchy acronyms and use of alliteration in naming projects are fun for those who create them. However, processes do not change overnight because the medical director waves a fancy wand and hands the team another new named project. Team buy-in and continuous oversight are essential for enduring success.
- 6) At first, expect that incident reports (episodes of care) will increase with the heightened attention.
- 7) Partner with laboratory and IT team members to help craft electronic alerts to mitigate the problems (missed signals of safety) arising from abnormal lab results. Predictive analytics is an area that is underutilized in dialysis. Our IT team has wonderfully responded to the requests that really made a difference: automated alerts that don't have too much background noise; clinical decision prompts; electronic prescribing protocols; remote smart device access for on-call coverage access to patient data.
- 8) Don't be afraid of prescribers and patients who threaten to leave and take their toys with them if their unsafe ways are not executed. Patient safety is priority, and is the responsibility of the steward of safety—the medical director. We collaborated with local clinics in our area to reduce the unethical solicitation of patients promising less time and larger dialyzer sizes.
- 9) Don't be afraid to have the physicians called to validate Vancomycin and other antibiotic plans to avoid injudicious use of antibiotics. We instituted a promotion for incenter first use of oral trimethoprim/sulfamethoxazole for non-contraindicated patients for iffy scenarios. One example is the common call from an RN to administer antibiotics for a red post surgical access site until MD can review the following day. Avoiding catheters is essential to antibiotic reduction efforts.



For clinics that have many prescribers, advanced practitioners, trainees, and others, it will likely be more challenging and may take more time to achieve what we have achieved. Don't get discouraged. With increasing number of prescribers, there is a greater the need for tightening the safe ranges of therapy to prevent the extremes and missing the mark for safety.

Final Thoughts

- Despite the timeline of safety in dialysis being populated with several advances in technology and technique, preventable safety failures echo as recurring themes.
- A broadened focus on the culture of safety presents opportunities for the industry to share working examples of algorithms, QAPI projects, and P&Ps in an effort to advance the safety discussion from theory to practice for everyone.
- Signals of safety in dialysis are commonly missed. Failure to recognize and respond in a timely manner risks harm to patients.
- While categories of safety failures have been well described in the literature, the industry has not adequately shared problem-solving strategies for some of the most preventable repeat patient harm events.
- Failure of pattern recognition with small clinic numbers may preclude effective QIP for some clinics. The industry must focus more on open sharing of experiences and the dissemination of practical solutions in order to mitigate safety failures that repeatedly risk harm to patients in all realms. Expanded reporting of occurrences (near misses and hard hits) is important and is lacking. Even if reported however, few internal safety registries exist which could offer some practical insights from the collective experiences.
- Our profession relies on organizations such as RPA, which promote the venue for sharing safety failures and practical solutions.
- The community needs to push for the 5 star ratings to be safety based. After all, how can dialysis success be truly measured without consideration for patient clinical tolerance and intolerance?

Hypotension and Cardiovascular Instability in Hemodialysis

PURPOSE: Guide for management of intradialytic cardiovascular instability

Background, Definitions and Need:

Dialysis cardiovascular instability (DCI) and Intradialytic hypotension (IDH) occur frequently (reported 20-30% of conventional HD treatments) and can be reduced with 4 hour minimum time on dialysis, maximum UFR of 10mL/hour/Kg, increased frequency of dialysis, lowering dialysate temperature, reducing antihypertensive medications prior to dialysis, reducing interdialytic fluid gains, improving nutritional status, avoiding acute alkalosis, and using near normalcy principles that reduce non-physiological rapid rates of change or shifts in dialysis. Higher sodium delivery therapies and higher calcium dialysate have been shown to reduce IDH—however, delayed consequences of higher sodium therapies and concerns regarding vascular disease have limited current use.

DCI and intradialytic hypotension (IDH) are intradialytic morbid events (IMEs) and will be used interchangeably for purposes of this P&P.

Symptomatic IDH influences patient compliance, optimum volume and uremic acidosis management, treatment failures, sign-offs, and hospitalization rates.

IDH related clinical intolerance usually refers to a reduction in SBP associated with sudden symptoms or signs: mental status changes (including changes in attention and focus, blank stares), fainting or syncope, lightheadedness or dizziness, nausea, vomiting, pale skin, cold and clammy, vision changes (including blurry vision), changes in breathing (including rapid and shallow breathing or shortness of breath), cramps, chest pain, ear pressure changes (popping ears, ear fullness), sudden dysphonia (hoarseness), hiccups, excessive yawning, sudden thirst, or suddenly feeling sleepy.

Evidence suggests that cardiac and brain ischemic injury occurs during dialysis even above the traditional safe SBP limits.

IDH can be affected by many things including: reduced blood volume,

high ultrafiltration rate, total volume removal, blood loss, antihypertensive medications, cardiac instability, sepsis, infection, reactions to medications or devices, allergic reactions, rapid rate of intravenous medication administration (such as iron and vancomycin), air and thrombotic embolism, cerebrovascular event, endocrine disorders, low volume states, device malfunction and errors in care. Dialysate containing acetate, low magnesium & calcium and rate of electrolyte changes, and body positioning in dialysis may contribute as causal factors in IDH.

IDH can result in loss of residual renal function (RRF), as well as cardiovascular, cerebral, and bowel ischemia.

*While ultrafiltration profiles have been used extensively and some suggest potential benefit of reduced IDH with higher UFRs during first hour lowered for remaining period, this P&P does not reference a preferred method; UF profiles must be prescribed for each patient; however, caution should be taken as early sign offs can result in higher UFRs if fluid removal is set for higher rates during first ½ of treatment.

Three common IDH presentations occur: chronic pre-dialysis hypotension; rapid sudden and symptomatic IDH; gradual declining and typically asymptomatic IDH.

Close monitoring of patients using accurate techniques in hemodynamic monitoring are critical aspects for patient safety. *This P&P does not include device-assisted techniques used for intravascular volume monitoring and assessment.

*This P&P sets limits above traditionally described intradialytic hypotension and requires more frequent monitoring to proactively mitigate IDH events.

IDH: (SBP) Systolic Blood Pressure < 100 mmHg

Chronic pre-dialysis hypotension (SBP) < 100 mmHg

Impending DCI: symptomatic decrease in SBP > 20mmHg or MAP (mean arterial pressure) reduction by 10mmHg

Optimum Volume Status (*dry weight*): [lowest achievable weight just before clinical intolerance symptoms occur] (modified from Palmer and Henrich, 2008). *It is often misjudged.

Policy and Procedure:

- Equipment and standard technique: Usual supplies: face mask, eye protection, gloves (PPE); appropriate safety and infection prevention techniques required for dialysis including standard personal protective equipment (PPE)
- Identification and immediate reporting to charge nurse (escalation) of new IDH or impending DCI
- Immediate reduction of UFR to minimum (minimum) for 30 minutes
- Reduce Blood flow rate (BFR) to 300 cc/minute as tolerated for remainder of hemodialysis session and set dialysate temperature at 35 degrees (34 if machine allows).
- Depending on severity of IDH symptoms, bolus 0.9% Normal Saline (NS) in increments of 200cc and re-evaluate immediately after each bolus.
- Depending on severity of IDH symptoms, lay patient flat and place in Trendelenberg position if severe symptoms persist.
- Remain at patient station until resolution of IDH and symptoms for a minimum of 5 minutes after resolution; after resolution, repeat vitals every 5 minutes x 3 for the next 15 minutes to ensure safety.
- Encourage increase in dialysis time in increments of 15 minutes as per **Time Increase for Patient Safety Policy** for that session.
- If IDH worsens, or remains unimproved beyond 5 minutes, contact prescriber for further instructions and review of causal factors for future mitigation plans.
- Add oxygen at 2 liters/minute via nasal cannula
- After 30 minutes in minimum, reduce by ½ remaining volume removal goal
- Document IDH episodes for prescriber and performance improvement review; take caution regarding stacking of fluid and leaving heavy
- Record **Caution in Care** Tickler information if unique threshold limits of fluid removal identified, and if SBP unique safety threshold for patient identified including prescriber limit for SBP and change from initiation of session for patients with chronic hypotension.
- Educate patient regarding preventive strategies; consider extra and more frequent treatments

***Principles, Safety Precautions, and Points to Consider:**

- Identifying new onset IDH and changes in treatment clinical tolerance for the patient (especially if occurs unexpectedly during early part of dialysis) requires immediate escalation to prescriber for problem solving. Sudden new onset IDH in early part of dialysis may suggest an ominous or life-threatening etiology—it requires immediate MD notification for problem solving, and consideration for discontinuation of dialysis session.
- Recirculation of access resulting in dangerous electrolyte abnormalities can rarely be a cause of IDH, however, should be considered especially if early system clotting is occurring, and especially with poorly functioning dialysis access including catheter use.
- If sudden widespread IDH occurs during a dialysis shift, escalation to medical director immediately for review is necessary.
- Falling DBP, pulse rate changes, and approaching low 110s SBP may indicate impending DCI and warrant earlier initiation of mitigation strategies outlined above.
- Improving intravascular refill and reducing rapid osmotic and electrolyte shifts during dialysis (increased time on dialysis, lower UFRs, lower DFRs, lower dialysate temperature, lower BFRs and smaller dialyzer) may help reduce IDH. However, with time increases and higher efficiency and larger dialyzer use, adjustment in other prescription aspects may be necessary to reduce overshooting that may occur.
- There are few patients experiencing recurrent IDH despite safe efforts to resolve. Consideration for peritoneal dialysis and other forms of frequent dialysis may offer safer options for therapy.
- Medication review to reduce medications that can interfere with vascular refilling and cardiac function should be done by prescriber. (nitrates, other)
- Avoid: acute alkalosis, sudden and rapid electrolyte shifting, high BFRs, high UFRs, and missing optimum volume status.
- Intradialytic therapy (with hypertonic saline, sodium bicarbonate, dextrose, albumin or mannitol) or oral therapies (midodrine) may offer some improvement; however, there are risks associated with such therapies.
- Waiting for BP/HR alarms on machines to sound for action is a failure of safety prevention strategies. Monitoring closely for

trending vitals that suggest impending DCI is invaluable for harm prevention. Caution should occur requiring more frequent vitals, patient review, and consideration for earlier reduction in BFR and UFR as SBP approaches low 110s mmHg. Often times, staff may miss the 20mmHg drop from baseline; therefore, a hard number level should be considered as a default secondary failure prevention strategy above the 100mmHg mentioned above. Mitigating hard hits by reducing episodes where SBP drops below 100mmHg is a goal for staff and patients to focus on, instead of waiting to react when SBP falls below this mark.

- At the beginning of dialysis, calculation of the 20mmHg drop from baseline should be recorded where easily referenced by staff, and also considered by engaged patients.
- If hypotension occurs post dialysis after needles are removed, contact MD.

Medical Director Signature and Date:

UFR: Ultrafiltration rate

BFR: Blood flow rate

DBP: Diastolic Blood Pressure

SBP: Systolic Blood Pressure

BP: Blood Pressure

HR: Heart Rate

References:

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CRAMPS

PURPOSE:

Guide for managing cramps (without hypotension) in hemodialysis

Background and Need:

Cramps in dialysis are common; albeit, reduced with 4 hour minimum time on dialysis, maximum UFR of 10mL/hour/Kg, and using near normalcy principles that reduce non-physiological rapid rates of change or shifts in dialysis. Cramps influence patient compliance, optimum volume and uremic acidosis management, treatment failures, sign-offs, and hospitalization rates. Cramps, which are intradialytic morbid events (IMEs), are the result of ischemia and may forewarn of impending doom. Several causal and contributing factors have been suggested including: excessive (UFR) ultrafiltration or fluid removal rates, and high (BFR) blood flow rates; electrolyte and osmolar shifts and imbalances; vascular insufficiency; diabetes status and intracellular water (ICW) shifts; parathyroid, thyroid and other endocrine disorders; sleep apnea and other sleep disturbances; cardiac disease; exaggerated cardiovascular response to perceived hypoxia or hypovolemia; and other factors including certain medication use and alkalosis.

Appropriate management of cramps improves dialysis patient satisfaction and quality of life.

Patient education and engagement in care, as well as early detection and escalation help mitigate cramping episodes, prevent recurrences, and reduce chances of impending safety failures.

Repeat unmonitored actions by staff and knee-jerk responses to cramps without recording and escalating (disregarding, believing

that cramps are simply expected with dialysis) have caused delays in prescriber review, missed opportunities for mitigation efforts, and repeat harm to patients.

Prevention of dialysis related cramping requires problem solving approaches starting with accurate identification, reporting, and trending of occurrences: early, mid, or late (including post dialysis).

Trending of episodes is important. The frequency and severity of cramping episodes are necessary for adequate surveillance and performance improvement strategies.

*Cramping associated with hypotension should be treated as hypotensive episodes according to the hypotension P&P.

Education of Staff and Patients:

- Causal factors
- Patient & staff commitment to averting cramping episodes including: early escalation; preventing hemodynamic & vascular refill-related compromise during dialysis; reducing interdialytic weight gain & dietary sodium; increasing time on dialysis & frequency as needed; using low UFRs; reducing excessive osmolar & electrolyte shifts; avoiding missed treatments & sign offs; and maintaining near normalcy principles in dialysis therapies.
- Early identification and timely escalation reduces inappropriate management and excessive saline administration, sodium loading through unnecessary profile variation techniques, and interrupted therapies.

Policy and Procedure:

- Equipment and standard technique: Usual supplies: face mask, eye protection, gloves (PPE); appropriate safety and infection prevention techniques required for dialysis including standard personal protective equipment (PPE)
- Identification and immediate reporting to charge nurse (escalation) of cramping
- Immediate reduction of UFR to minimum (minimum) for 30 minutes
- Reduce Blood flow rate (BFR) to 300 cc/minute as tolerated for remainder of hemodialysis session
- Encourage increase in dialysis time in increments of 15 minutes as per **Time Increase for Patient Safety Policy** for that session.
- If cramping persists, administer 0.9% normal saline (NS) 100cc bolus given incrementally as needed for a maximum of 300 cc.
- After 30 minutes in minimum, reduce by ½ remaining volume removal goal
- If cramping worsens or remains unimproved, add oxygen at 2 liters/minute via nasal cannula and contact prescriber for further instructions and review of causal factors for mitigation plans.
- Document cramping episodes for prescriber and performance improvement review; take caution regarding stacking of fluid and leaving heavy
- Record **Caution in Care** Tickler information if limits of fluid removal identified
- Educate patient regarding preventive strategies; consider extra and more frequent treatments
- *This P&P does not include device-assisted techniques

used for intravascular volume monitoring and assessment.

***Principles, Safety Precautions, and Points to Consider:**

- Identifying type of cramps as early and unusual for the patient requires more rapid escalation to prescriber for problem solving.
- Recirculation of access resulting in dangerous electrolyte abnormalities can rarely be a cause of cramping, however, should be considered especially if early system clotting is occurring, and especially with poorly functioning dialysis access including catheter use.
- For patients with low volume status, residual urine output especially with aggressive diuretic use, high glucose or other causes of low ICW including diarrhea, saline administration during dialysis and re-evaluation of prescription execution may be necessary to adjust for intracellular water (ICW) to extracellular (ECW) water excessive shifting that can worsen cramping episodes.
- For recurring cramps, information should be shared with prescriber including: medications; nutritional status and electrolytes; presence of chronic gastrointestinal fluid losses; anemia; hemodynamic stability & volume status; diabetes status & glucose control; glucose levels at time of dialysis initiation as compared with starting of cramps; serum sodium-dialysate gradients; alkali delivery during dialysis; composition and type of dialysate; insulin use prior to dialysis; dialyzer size and efficiency; prescription details including BFR, DFR, temperature setting for dialysate; other factors that affect clinical tolerance of dialysis including osmolar and electrolyte shifting during dialysis.
- If sudden widespread cramping occurs during a dialysis

shift, escalation to medical director immediately for review is necessary.

- Improving intravascular refill and reducing rapid osmotic and electrolyte shifts during dialysis (increased time on dialysis, lower UFRs, lower DFRs, and lower BFRs) generally reduce cramps. However, with time increases and higher efficiency dialyzer use, adjustment in other prescription aspects may be necessary to reduce overshooting that may occur.
- There are few patients experiencing cramps at early part of dialysis despite safe efforts to resolve. Consideration for peritoneal dialysis and other forms of frequent dialysis may be beneficial in resolving the recurring cramps. Intradialytic therapy (with hypertonic saline, sodium bicarbonate, dextrose, albumin or mannitol) or oral therapies (such as pentoxifylline or quinine) may offer some relief; however, there are risks associated with such therapies. Unexplained cramps may also be a sign of rare renal function recovery.

Medical Director Signature and Date: