Are We Listening?
Patient Experiences and Symptoms as They Relate to Volume and Blood Pressure Management

Suzanne Watnick, MD, FASN
KDIGO Controversies Conference
Lisbon, 8 February 2019
Objectives

• Introductory remarks: Volume & BP Management in Dialysis

• Discuss data supporting an association between blood pressure and volume and patient-reported outcomes
  • Including but not limited to symptoms and health-related quality of life.

• Review role of dietary restrictions in blood pressure and volume management and patient experiences and preferences with regard to dietary restrictions.
For Dialysis Patients...

• Volume management can be difficult at best
  • Hypertension and hypotension are:
    • common
    • poorly controlled +/- addressed
    • associated with potentially harmful symptoms to patients
  • Harm can also result from imprecise management

• “I hated dialysis. I could never get my treatment just right. One day it was cramping, the next it was more medicine for blood pressure. Now that isn’t right.”
• “Sometimes the treatments felt worse than nothing at all”

- In-center and home HD patients
Northwest Kidney Centers, 2019
In the Dialysis Population

• Hypertension is:
  • Common and poorly controlled
  • Directly associated with poor survival outside the dialysis facility
  • Due to many causes:
    • Sodium & (essentially synonymous with) volume excess
  • Thus, treatment must address volume management
BP is not well-controlled in ESRD patients receiving chronic in-center hemodialysis

Pre-dialysis systolic blood pressure, categories
National sample

<table>
<thead>
<tr>
<th>Month</th>
<th>&lt; 120</th>
<th>120-139</th>
<th>140-159</th>
<th>160-179</th>
<th>&gt;= 180</th>
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<tr>
<td>DEC17</td>
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In the Dialysis Population

• Hypertension is:
  • Common and poorly controlled
  • Directly associated with poor survival
    • When assessed outside the dialysis facility
  • Due to many causes:
    • Sodium & (essentially synonymous with) volume excess
  • Thus, treatment must address volume management
Survival & HD Patient Blood Pressure Measurement

Prognostic information obtained:

- From Home and Ambulatory BP recordings
- Not from Dialysis Facility BP recordings
Patient Input Needed to Address Treatment

- Recommendations: ‘gold standard’ BP assessment should be based on home BP or ABPM measurements.
- **However**, long-term adherence of patients on HD with requirements for repeated HBPM and ABPM is unknown.
  - What are **patient preferences**?
  - How do we address **symptoms**?

---

EURECA statement, Sarafidas PA, J Hypertension 2017
Agarwal, JASN, 2014
Parati, J Hypertension, 2014
Importance of Patient Input

• KDOQI recommends predialysis SBP <140 mmHg on the basis of expert opinion.

• However, observational studies found increased mortality in HD patients with SBP≤140 mmHg

• There is uncertainty regarding the optimal BP level and type of measurement.
  • Predialysis SBP may be inferior to home BP measurements and ambulatory BP monitoring in predicting clinical outcomes.
  • long-term adherence of patients on HD with requirements for repeated HBPM and ABPM is unknown.
Objectives

• Introductory remarks: Volume & BP Management in Dialysis

• Discuss data supporting an association between blood pressure and volume and patient-reported outcomes
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Symptoms Burden in Dialysis Patients

• On average, patients suffer from 11 symptoms
  • Fatigue, cramping, nausea, insomnia, aches/pain
  • Symptoms are underreported and under recognized

• Patients want more interaction around their symptoms

• Symptom relief is a top priority
  • Per patients and other team members
  • Increased focus in research and clinical practice

Weisbord, JASN, 2005
Abdel-Kader, CJASN, 2009
Manns, CJASN, 2014
Cox, HI, 2017
Evangelidis, AJKD, 2017
Flythe, NDT, 2018
Flythe, CJASN, 2019
Symptoms management can be a balancing act.

As soon as the cramps start, I’m yelling’. You never die, but it’s so painful that you think that you do. [55y F]

I just kind of panic when I can’t get a deep breath. It’s like I feel like I’m going to smother. [76y F]

Courtesy J Flythe
ESRD-specific Symptoms & Index

• 2 Indexes developed: 12 symptoms and 12 emotions
• First developed to compare Dialysis and Transplant patients
• Symptoms assessed in 97 Dialysis, 82 Transplant patients
  • Re-interviewed at 1 year
  • Most common: fatigue, cramps, dyspnea, headaches, pruritus, and joint pain
  • Little difference between HD and PD, long-standing, frequent
• Change over time
  • Minimal change at 1 year in dialysis patients
  • Marked improvement in fatigue, dyspnea, cramps, n/v in 14 transplanted patients

Parfrey, Nephron, 1988
Parfrey, Nephron, 1989
Physical & Emotional Symptoms

Aggregate Symptoms Score 0-10

- Transplant
- Dialysis

Symptoms Severity Y2  Symptoms Severity Y1
What Symptoms Dialysis Patients Report

In HD, Dialysis Symptoms Index:

- First comprehensive, psychometrically tested & validated questionnaire
  - Designed for assessing physical and emotional symptoms
  - 30 items: Fatigue, dry skin, dry mouth, itching most common
  - Cramps, swelling, lightheaded/dizzy, nausea/vomiting bothersome
  - Patient reports did not correlate well with physician reports

Weisbord, J Pain Symptom Manage, 2004
Health Related Quality of Life (HRQOL)

• No unequivocal definition:
  • A complete state of physical, mental, and social well-being and not merely the absence of infirmity
  • An individual’s or a group’s perceived physical and mental health over time

• Growing literature in CKD
• Goal of what we do! Basic aspect of health!
• Associates with morbidity and mortality

CDC, https://www.cdc.gov/hrqol/index.htm, accessed 1/15/19
WHO, https://www.who.int/healthinfo/survey/whoqol-qualityoflife/en/, 1/15/19
What impacts a patient’s HRQOL?

Quality of Life

Global Domains
- Happiness
- Spirituality
- Perceived health

Social Domains
- Sexual Dysfunction
- Marital Satisfaction
- Social Support

Physical Functioning Domains
- Sleep Disturbance
- Pain
- Physical Activity

Psychological Domains
- Depression
- Anxiety
- Cognitive function
Measurement of HRQOL

• Conditions of Coverage of Dialysis Facilities (494.90) require all dialysis patients assessed yearly in U.S.
  • Responses → personalized ‘Plan of Care’
  • Primary instrument – KDQOL-36 short form
    • Contains Mental Health and Physical Health subscores (SF-12)
    • Validated in other countries and other languages, 4 week recall
  • Multiple instruments
  • Few in PD: mostly compare HD to PD, generally higher scores
    • Differences partly reflect policies
    • PD patients tend to have higher scores, more functional
    • Automated not been proven to be different than manual

Hays, Qual Lif Res, 1994
Hays, RAND, 2000
Moreiras-Plaza Int J Nephrol 2011
Beiber, AJKD, 2014
Peipert, AJKD, 2018
Multiple Instruments used to show Associations between Symptoms and HRQOL

<table>
<thead>
<tr>
<th>Questionnaire</th>
<th>Population</th>
<th>Domains</th>
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<tbody>
<tr>
<td>Kidney Disease QOL Questionnaire</td>
<td>HD</td>
<td>QOL &amp; Symptoms</td>
</tr>
<tr>
<td>CHOICE Questionnaire</td>
<td>HD and PD</td>
<td>QOL</td>
</tr>
<tr>
<td>McGill Quality of Life Scale</td>
<td>Kidney disease</td>
<td>QOL</td>
</tr>
<tr>
<td>Illness Effects Questionnaire</td>
<td>HD</td>
<td>QOL &amp; effects</td>
</tr>
<tr>
<td>Dialysis Symptom Index</td>
<td>HD</td>
<td>P &amp; E Symptoms*</td>
</tr>
<tr>
<td>Modified Edmonton Symptom Scale</td>
<td>HD</td>
<td>P &amp; E Symptoms</td>
</tr>
<tr>
<td>Patient Symptom Form</td>
<td>CKD</td>
<td>P &amp; E Symptoms</td>
</tr>
</tbody>
</table>

Weisbord, 2007 AJKD
Lopes CJASN, 2014
Amro, J Ren Care, 2014
Kraus, AJKD, 2016
Your Health

This survey includes a wide variety of questions about your health and your life. We are interested in how you feel about each of these issues.

1. In general, would you say your health is [Mark an X in the one box that best describes your answer]
   - Excellent
   - Very good
   - Good
   - Fair
   - Poor

2. Moderate activities such as moving a table, pushing a vacuum cleaner, bowling, or playing golf
   - Not at all limited
   - A little limited
   - Limited a lot

3. Climbing several flights of stairs
   - No, not at all limited
   - A little limited
   - Limited a lot

During the past 4 weeks, to what extent were you bothered by each of the following?

<table>
<thead>
<tr>
<th>Not at all bothered</th>
<th>Somewhat bothered</th>
<th>Moderately bothered</th>
<th>Very much bothered</th>
<th>Extremely bothered</th>
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</thead>
<tbody>
<tr>
<td>17. Stomach in your muscles?</td>
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<tr>
<td>18. Chest pain?</td>
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<tr>
<td>19. Cramps?</td>
<td></td>
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<tr>
<td>20. Itchy skin?</td>
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<tr>
<td>21. Dry skin?</td>
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<tr>
<td>22. Shortness of breath?</td>
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<tr>
<td>23. Fainting or dizziness?</td>
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<tr>
<td>24. Lack of appetite?</td>
<td></td>
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<tr>
<td>25. Washed out or drained?</td>
<td></td>
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<tr>
<td>26. Numbness in hands or feet?</td>
<td></td>
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<tr>
<td>27. Nausea or upset stomach?</td>
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</tbody>
</table>

* (Haemodialysis patient only)
  - Problems with your access site?

* (Peritoneal dialysis patient only)
  - Problems with your catheter site?
KDQOL-36 – Is It Reliable? Is It Valid?

- 70,786 patient records for analysis
- Good reliability – Cronbach alpha between 0.8 – 0.9
- Good validity – Large positive correlation coefficient - >= 0.37 (0.40 – 0.52)
- 4 week recall

Peipert, AJKD, 2018
Symptoms & Associated Recovery

Percent of Treatments - Fatigue occurred in 50%
Intradialytic hypotension & cramps 30%

Patient Symptoms

- Headaches
- Dizziness
- Cramps
- Hypotension
- Fatigue

Time to Recovery

- Getting Home: 24%
- Bedtime: 23%
- Next Morning: 34%
- Pre-Dialysis: 16%

Caplin, NDT, 2011
Symptoms & Blood Pressure during Hemodialysis

- 76 patients, 456 sessions, Post-dialysis questionnaire
- Interventions occurred
  - If patients reported symptoms

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Frequency</th>
<th>Associations</th>
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</thead>
<tbody>
<tr>
<td>Nausea</td>
<td>22%</td>
<td>Age, not BP</td>
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<tr>
<td>Cramp</td>
<td>12%</td>
<td>SBP, not DBP</td>
</tr>
<tr>
<td>Dizziness</td>
<td>8%</td>
<td>SBP, not DBP</td>
</tr>
</tbody>
</table>

Meredith, Hemodial Int, 2015
Patient Symptoms: Can We Target Them Better?

Where should we target symptom control in dialysis patients? I don’t know, maybe we should ask them?

Three focus groups
- Three focus groups
  - 32 participants

Physical symptoms
- Insomnia, fatigue, muscle cramping, nausea/vomiting, body aches, etc.

Mood symptoms
- Anxiety, depression, frustration, etc.

Prioritization
- What factors would people use to prioritize symptom importance:
  - Frequency
  - Duration
  - Unpredictability
  - Social impact
  - Financial impact

Online survey
- Used focus group information to form an online survey
- Online survey: 87 respondents

Physical
- Insomnia
- Fatigue
- Cramping

Mood
- Depression
- Anxiety
- Frustration

Conclusions
- Patients prioritized insomnia, fatigue, and cramping as top physical symptoms and anxiety, depression, and frustration as the top mood symptoms for which therapeutic innovations are needed to improve their lives.

Symptoms Reporting is Highly Variable

Seven Themes Emerged

Flythe, NDT, 2018
What Symptoms Were Reported:

- Fatigue
- Cramping
- Thirst
- Dizzy or Lightheaded
- Headache
- Nausea
- Numbness Tingling
- Shortness of Breath
- Itching
- Heart Palpitations
- Post-Dialysis
Development of PROM: SMaRRT-HD

• Routine collecting of standard sx$s$ promotes dialogue
  • In cancer patients: ↑ communication, ↓ healthcare use & mortality
  • Prior symptoms scales (e.g. KDQOL) review 4-week period

• Lack of standard, simple assessment in dialysis:
  • Limits ability to address symptoms & treatment responses
  • Need succinct PROM with short recall period to individualize

• New PROM based off guidelines
  • Semi-structured interviews
  • Item selection, measure construction, content evaluation → Final PROM

Flythe, Qual Life Res, epub 2018
Basch, J Clin Onc, 2016
What is SMaRRT-HD?

- Cramping
- Feeling washed out
- Lightheadedness
- Restless legs
- Nausea
- Vomiting
- Headache
- Tingling
- Thirst
- Shortness of breath
- Chest pain
- Heart palpitations
- Itching

Thirteen specific symptoms via interviews
No missing sx via interviews
Write-ins allowed

At least Ten Percent reporting frequency

One hemodialysis treatment recall
Objectives

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  • Including but not limited to symptoms and health-related quality of life.

• Review role of dietary restrictions in blood pressure and volume management and patient experiences and preferences with regard to dietary restrictions
In The Dialysis Population

• Hypertension is:
  • Common and poorly controlled
  • Directly associated with poor survival
    • When assessed outside the dialysis facility
• Due to many causes:
  • Sodium & volume excess is strongest contributor
• Thus, treatment must address volume management
<table>
<thead>
<tr>
<th>Pathophysiology of Hypertension in ESRD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sodium / Volume Overload</strong></td>
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<tr>
<td>Prominent mechanism: Excretion Impaired</td>
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<tr>
<td>Increase in Cardiac Output</td>
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<tr>
<td><strong>Increased Arterial Stiffness</strong></td>
</tr>
<tr>
<td>Pulse wave velocity &amp; pulse pressure impaired</td>
</tr>
<tr>
<td>Increase in Peripheral Vascular Resistance and CO</td>
</tr>
<tr>
<td><strong>Activation of SNS</strong></td>
</tr>
<tr>
<td>Overactivity prominent in ESRD</td>
</tr>
<tr>
<td>Vascular Tone and CO – renalse studies</td>
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<tr>
<td><strong>Activation of RAS</strong></td>
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<tr>
<td>Proven to occur in ESRD</td>
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<tr>
<td><strong>Endothelial Dysfunction</strong></td>
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<tr>
<td>Imbalance of dilators and constrictors</td>
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<tr>
<td>Increased PVR, reduced EF</td>
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<tr>
<td><strong>Other</strong></td>
</tr>
<tr>
<td>ESAs, Sleep Apnea, Other secondary causes</td>
</tr>
</tbody>
</table>
Pathophysiology of Hypertension

Uncontrolled hypertension

Left ventricular hypertrophy

Heart failure

Cardiac arrhythmias

Sudden cardiac death

Advancingdialysis.org
Zipes et al, Braunwald, Elsevier, 2018
In The Dialysis Population

• Hypertension is all of these things.
  • Common and poorly controlled
  • Directly associated with poor survival outside the dialysis facility
  • Due to many causes:
    • Sodium & (essentially synonymous with) volume excess
  • Thus, treatment must address volume management

• How can we include patient preferences?
Salt - A four letter word

First humans ingested 0.1-0.5g/d of salt. HTN rarely seen

Recommendations

- Minimum: 250-500 mg
- US RDI: 2,400 mg
- NAS: 1,500 mg
- Am. Heart Association: 1,500 mg
- World Heath Org: 2,000 mg
- EUPR: 575-3,500 mg
- DASH Diet: 3,000 mg
- US intake: 2,000-8,000 mg
<table>
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<tr>
<th>Barriers to dry weight in HD patients</th>
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<tbody>
<tr>
<td>Difficulty to objectively assess dry weight</td>
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<tr>
<td>Fear of patient symptoms (intradialytic hypotension, muscle cramps, nausea and vomiting)</td>
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<tr>
<td>Risk of complications (cardiovascular events, arteriovenous access loss)</td>
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<tr>
<td>Physician and nurse inertia/ease of prescribing a new drug vs the complex procedure of dry weight probing</td>
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<tr>
<td>Absence of patient education on dietary sodium restriction/misguided emphasis in fluid restriction</td>
</tr>
<tr>
<td>Low patient adherence with sodium restriction/high interdialytic weight gain</td>
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<tr>
<td>Use of high number of antihypertensive agents, High UF Rates, Short Dialysis Sessions</td>
</tr>
<tr>
<td>Use of ‘fast and easy’ solutions to treat intradialytic hypotension (i.e. stop UF, increasing dialysate sodium concentration, premature termination)</td>
</tr>
<tr>
<td>Concomitant diseases (heart failure, autonomic dysfunction)</td>
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Sarafidis, J Hypertension, 2017
<table>
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<tr>
<th>Sodium Intake - one barrier to dry weight in HD patients</th>
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<td>Absence of patient education on dietary sodium restriction/misguided emphasis in fluid restriction</td>
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Sarafidis, J Hypertension, 2017
Historical Perspective

Longer dialysis (6+ hours), lower dialysate sodium (130mM), and dietary sodium chloride restriction (< 5g/d) associated with lower blood pressures

- Study BPs fell from 147+9.3 to 136+17mmHg/88+5.5 to 80+9.6

Hegstrom, Trans Am So Art Int Organ 1962
Luik, JASN 1994
Krautzig, NDT 1998
“Restricting Fluid without Salt is a Waste of Time”

• 4kg gain in 44h with SNa⁺ 138mEq/L means:
  • 4L water + 552mmol Na⁺!
  • If you restrict from 4L without restricting sodium, SNa⁺ rises, and that is inhumane!
    • Any reduction is helpful
    • Educational tools being developed

Tomson, NDT, 2001
Clark-Cutaia, Top Clin Nutr. 2013
Studies Look at Lowering Dialysate Sodium on BP, but what about Interdialytic Period?

• KDOQI Guideline 4.2 recommends **reducing dietary sodium intake** as well as volume removal with HD to manage hypertension, hypervolemia, LVH (Grade for strength & quality: 1B)
  • No RCTs have tested the hypothesis that one method of BP control is superior to another
  • However, since ECV expansion is an important contributor to elevated BP, reducing ECV is first line treatment
  • Again, poor data to formulate clear guidelines on total sodium intake. Nonetheless, it is recommended.
KDOQI Clinical Practice Guidelines for Hemodialysis: 2015

- Use as a roadmap, not a mandate
- Greater emphasis on **shared decision making**
- Does not take the place of clinical judgment and **individualization of treatment for a patient**
- Data to back clinical decisions to ensure we use it appropriately for pts
- Increased recognition on the importance of **volume management in blood pressure control**
  - This guideline makes significant comments on how that should be applied in clinical practice

Dietary Restrictions

• Given the paucity of data, KDOQI recommends:
  • Testing and validation of practical tools to ascertain EDW
  • RCTs risk/benefit altering dialysate Na
  • RCT effect of altering UF rate on outcomes
  • **Assess ideal dietary sodium intake for dialysis patients**
  • Study minimal and ideal Rx time while assessing clinical outcomes and patient preferences
Lowering Salt Intake has modest effect on IDFG and Blood Pressure: Observational Data

PD (N=31): <5g/d salt (2+g/d Na+), Education around BP & diet, BIA

In-center HD (5g/d salt restriction vs. use of BP medications)

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<thead>
<tr>
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<th>Center A (N=190)</th>
<th>Center B (N=204)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BP Medication (%)</td>
<td>7</td>
<td>42</td>
</tr>
<tr>
<td>Weight Gain (kg)</td>
<td>2.3 ± 0.83</td>
<td>3.3 ± 1.1</td>
</tr>
<tr>
<td>Systolic BP &gt;140 (%)</td>
<td>18</td>
<td>37</td>
</tr>
</tbody>
</table>

P=0.04, P=0.01, P=0.01

Kayikcioglu, NDT, 2009
A systematic review of psychological interventions for improving fluid-intake restrictions in people receiving hemodialysis

• **Results:** Sixteen studies were identified as eligible for inclusion.
  • Nearly all studies showed a postintervention decrease in interdialytic weight gain (IWG).
  • **Conclusion:** Confidence regarding the validity of this finding is poor and susceptible to bias.
    • Sample size too small.
    • Intervention protocols were unclear
    • Contextual appropriateness of different approaches not well-understood
    • What are the key treatment components to improving adherence to fluid-intake restrictions
Psychological Interventions to Limit Fluid Intake, all Incorporated Education

<table>
<thead>
<tr>
<th>Behavioral modification</th>
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<tbody>
<tr>
<td>Cognitive Therapies</td>
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<tr>
<td>Self regulation/self monitoring</td>
</tr>
<tr>
<td>Social Reinforcement</td>
</tr>
<tr>
<td>Skills Management</td>
</tr>
<tr>
<td>Stress Management</td>
</tr>
</tbody>
</table>

Sharp, AJKD, 2005
How do Patients Feel about Dietary Restrictions in Dialysis?

• 46 studies: 33 HD, 10 PD, 3 Both
• 5 themes:
  • Preserving relationships
  • Navigating change
  • Fighting temptation
  • Optimizing health
  • Becoming empowered
• Dietary restrictions are:
  • Disorienting at best
  • Intense burden at worst
• Suggested strategies to reduce impact on QOL:
  • Patient prioritized education
  • Harnessing patient motivation
  • Viewing adaptation as collaborative journey

Palmer, AJKD, 2015
Example of Psychological Distress and Fluid Restriction

- 271 Brazilian Chronic In-Center HD patients
- ‘More bothered by fluid restriction’ associated with worse QOL
- KDQOL used to measure HRQOL
- High prevalence of poor acceptance
  - 52.4% moderately or extremely bothered by fluid restriction

Silva, Int J Artif Organs, 2014
What is the emotional impact of illness and care on patients with advanced kidney disease?

Methods and Cohort

27 semi-structured interviews
VA Puget Sound Health Care System
April 2014-May 2016

Emergent Themes

- Interactions with individual providers
  - Insufficient interest or concern
  - Alienation
  - Mistrust
  - Abandonment
  - Isolation

- Health system interactions
  - Fragmented care system
  - Alienation
  - Mistrust
  - Abandonment
  - Isolation

- Meaning-making
  - Struggle to make sense of illness
  - Apportioning blame
  - Personal responsibility
  - Undoing

Conclusions
Illness and interactions with providers and the health system can take a large emotional toll on patients. A deeper understanding of patients' emotional experiences may offer opportunities to improve care.

Ann O'Hare, Claire Richards, Jackie Szarka, Lynne McFarland, Whitney Showalter, Elizabeth Vig, Rebecca Sudore, Susan Crowley, Ranak Trivedi, and Janelle Taylor. Emotional Impact of Illness and Care on Patients with Advanced Kidney Disease. doi: 10.2215/CJN.14261217

Ann M. O'Hare et al. CJASN 2018;13:1022-1029
Objectives

- Introductory remarks: **Volume & BP Management in Dialysis**
- Discuss associations between blood pressure and volume and **patient-reported outcomes**
  - Including but not limited to symptoms and health-related quality of life.
- Review role of **dietary restrictions** in blood pressure and volume management and patient experiences and preferences with regard to dietary restrictions.
Summary

• Patient reported symptoms are frequent
  • Often related to blood pressure control and volume management.
  • Associated with poor HRQOL
• Dietary restrictions are burdensome with little guidance
  • Sodium restriction is important but difficult to achieve
  • Large opportunity for study in this area.
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Patients' perspective of haemodialysis-associated symptoms.

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Introduction. Patients often report symptoms during haemodialysis (HD). To better understand patients' experience, we surveyed routine HD outpatients, to quantify the burden and duration of dialysis-associated symptoms.

METHODS:
Five hundred and eight symptom questionnaires were returned from 550 HD outpatients (92.4%). The symptoms in relation to the HD session were analysed using a visual analogue score. Multivariate logistical regression analysis was used to identify characteristics associated with total symptom burden and time to recover following a HD session.

RESULTS:
Fifty-four percent of the cohort were male, median age 64 years, 36% diabetic and median age unadjusted Charlson comorbidity score 3.0 (2-5). Fatigue (82%), intradialytic hypotension (76%), cramps (74%) and dizziness (63%) were the commonest symptoms reported, followed by headache (54%), pruritus (52%) and backache (51%), with fatigue occurring with a median frequency of 50% of dialysis sessions and intradialytic hypotension and cramps in 30%. Some 23% reported recovering from dialysis within minutes, 34% by the time they returned home, 16% by bed time, 24% the following morning and 3% just before the next dialysis session. Symptom burden was associated with female sex, younger age, longer duration of dialysis sessions, ethnicity and dialysis centre practice. The time taken to recover from dialysis varied from minutes to hours and was shorter for men and greater dialysis vintage but longer with increasing session time and those with increased intradialytic symptom burden.

CONCLUSIONS:
Despite advances in HD, intradialytic symptoms were frequently reported by our patients. There was substantial unexplained variation in symptom burden across centres, suggesting that clinical practice or policies may play a role in preventing the adverse effects of dialysis. Symptom burden was worse in women, patients of South Asian as opposed to African origin and also in those receiving a longer duration of dialysis. These patients may therefore benefit from a different approach to dialysis prescription.