Critical and Honest Conversations: The Evidence Behind the "Choosing Wisely" Campaign Recommendations by the American Society of Nephrology

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Summary

Estimates suggest that one third of United States health care spending results from overuse or misuse of tests, procedures, and therapies. The American Board of Internal Medicine Foundation, in partnership with *Consumer Reports*, initiated the "Choosing Wisely" campaign to identify areas in patient care and resource use most open to improvement. Nine subspecialty organizations joined the campaign; each organization identified five tests, procedures, or therapies that are overused, are misused, or could potentially lead to harm or unnecessary health care spending. Each of the American Society of Nephrology's (ASN's) 10 advisory groups submitted recommendations for inclusion. The ASN Quality and Patient Safety Task Force selected five recommendations based on relevance and importance to individuals with kidney disease.Recommendations selected were: (*1*) Do not perform routine cancer screening for dialysis patients with limited life expectancies without signs or symptoms; (*2*) do not administer erythropoiesis-stimulating agents to CKD patients with hemoglobin levels ≥10 g/dl without symptoms of anemia; (*3*) avoid nonsteroidal anti-inflammatory drugs in individuals with hypertension, heart failure, or CKD of all causes, including diabetes; (*4*) do not place peripherally inserted central catheters in stage 3–5 CKD patients without consulting nephrology; (*5*) do not initiate chronic dialysis without ensuring a shared decision-making process between patients, their families, and their physicians.These five recommendations and supporting evidence give providers information to facilitate prudent care decisions and empower patients to actively participate in critical, honest conversations about their care, potentially reducing unnecessary health care spending and preventing harm.

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Introduction

Recently, the American Society of Nephrology (ASN) joined the American Board of Internal Medicine Foundation and Consumer Reports in the "Choosing Wisely" campaign to identify tests, procedures, and therapies that are overused or inappropriately used and may potentially cause harm, thus increasing unnecessary health care spending (1). Campaign organizers asked key national specialty societies to evaluate best practices and evidence-based medicine and identify misused or overused tests, procedures, and therapies. Each specialty society was asked to develop a list of five "Don't do" recommendations to guide clinicians.

The "Choosing Wisely" campaign strongly reflects ASN's focus on promoting high-quality and affordable kidney care for all patients with kidney disease. The increasingly high cost of health care has gained the attention of providers, insurers, patients, and the government. New models of care (such as the patient-centered medical home and accountable care organizations) focus on improving patient outcomes while decreasing overall costs of care, and accountable, collaborative health care management is now an expectation of every provider.

However, to improve quality while reducing health care costs, providers and patients must develop a strong partnership. Providers and patients must share responsibility for understanding individual patients' goals and preferences and for making decisions about treatments. These collaborative discussions help patients assess potential risks and benefits of interventions, help providers to better understand patient preference, and thus reduce unnecessary testing, procedures, and treatments, which account for one third of current medical care spending.

ASN's Quality and Patient Safety (QPS) Task Force, charged with raising awareness of quality and patient safety issues and promoting high-quality care for all patients with kidney disease, led ASN's "Choosing Wisely" efforts. The Task Force is composed of members of ASN's 10 advisory groups (Acute Kidney Injury, Chronic Kidney Disease, Dialysis, Geriatric Nephrology, Glomerular Diseases, Hypertension, Interventional Nephrology, Practicing Nephrologists, Physiology and Cell Biology, and Transplant Advisory Groups). The QPS Task Force focused on identifying items that were evidence-based, could significantly influence patient outcomes, and reflect the ASN's commitment to reducing complications of CKD and managing or

preventing comorbid conditions in patients with CKD of all stages. In this article, we present the final five "Choosing Wisely" "Don't do" recommendations, the rationale for these specific recommendations, and two other recommendations that were ranked highly.

Method for Identifying the Five "Choosing Wisely" Recommendations

After meetings with their respective ASN advisory groups, each member of the QPS Task Force submitted the top three to five recommendations for the "Choosing Wisely" list identified by their advisory groups. The QPS Task Force discussed each recommendation, narrowed the list to 22 items, and voted *via* an online survey tool (Survey Monkey) to determine the recommendations that would have the largest positive impact on patient care and outcomes. At least 50% of the Task Force members voted for the same six items. These top six items were reviewed by the QPS Task Force's oversight body, the ASN Public Policy Board. The Public Policy Board unanimously approved five of the six items. Evidentiary statements were drafted by two QPS Task Force members per item based on scholarly review of the literature and best practice guidelines. Members of the QPS Task Force brought forth ideas and expertise from their respective advisory groups and worked collaboratively on all the recommendations because each recommendation chosen was relevant to all patient populations and areas of nephrology represented. In addition, as directed by the "Choosing Wisely" campaign, a list of primary organizations whose research or resources provided the evidence to support each item was compiled. Each drafted statement was reviewed and edited by the entire Task Force. All recommendations were worded to follow a common theme of "Don't do" as per the template of the "Choosing Wisely" campaign. After discussion with the QPS Task Force chair, the final list of five items was reviewed and unanimously approved by the ASN Council (2).

Recommendations

The recommendations are listed in Table 1.

1. Routine cancer screening for dialysis patients with life expectancies of <5 years (3) does not improve survival and is not cost-effective.

"Choosing Wisely" campaign recommendation (CWCr): "Do not perform routine cancer screening for dialysis patients with limited life expectancy without signs or symptoms."

Patients with ESRD have a significantly high mortality rate, with most deaths due to cardiovascular disease and complications of infection (4). Although certain cancers occur more commonly in dialysis patients, including cancer of the kidney and cancers associated with human papillomavirus (such as cervical cancer and carcinoma of the tongue), cancer is a relatively rare cause of death among dialysis patients (5). As a result, cancer screening, as it is applied to the general population, does not improve mortality and can incur significant cost and morbidity associated with screening procedures (6–8). In a study by Chertow *et al.* (6), the net gain in life expectancy from a typical cancer screening program was 5 days or less in persons with ESRD; the costs per unit of survival benefit conferred by cancer screening in persons with ESRD were up to 19.3 times greater than those in the general population. Similar analyses have shown lower than expected gains in life-years from routine screening for breast and cervical cancer in women undergoing dialysis (9,10).

Screening may lead to false-positive results that require unnecessary procedures, overtreatment, and misdiagnosis in patients with shorter life expectancies. For instance, patients with ESRD are known to have occult mucosal bleeding from the gastrointestinal tract due to inflammation of the mucosa, anticoagulation use, and defective platelet function due to uremia, leading to a higher incidence of false-positive rates of fecal occult blood testing and the need for follow-up colonoscopy. Given the need for bowel regimens before endoscopy procedures and inability to eat for up to a day in patients who may already be nutritionally bereft, these tests also have some potential associated morbidity. Additionally, significant psychological consequences include increased anxiety and stress while waiting for diagnostic testing to be performed (11). Routine mammography for breast cancer screening can also lead to false-positive results in women with advanced CKD and ESRD. These women have an increased incidence of breast calcifications due to abnormalities in calcium-phosphorus-parathyroid balance. Most of these soft tissue breast calcifications are benign, but the pattern on mammography can be suspicious for malignancy; this may result in increased invasive procedures, such as biopsies, as well as unnecessary patient anxiety and stress (12).

Thus, cancer screening protocols developed for the general population should not be applied to the ESRD population as a whole but should be individualized to patients undergoing dialysis (in-center or at-home hemodialysis [HD] and peritoneal dialysis) who would benefit from screening on the basis of need, life expectancy, and cancer risk. Patients with ESRD who are eligible for kidney transplantation, those with reasonable life expectancy, and those who have undergone successful transplantation should undergo routine cancer screening because of their improved expected survival and higher risk for cancer (due to planned or ongoing immunosuppressive therapy) (13,14). In addition, screening should be considered for patients with increased cancer risk due to family history. Finally, nephrologists and primary care physicians should inform patients with ESRD of the harms and benefits of cancer screening to allow for informed, shared decision-making regarding screening choice (15). In sum, an individualized approach to cancer screening incorporating patients' health care goals and preferences, cancer risk factors, expected survival, and transplant status will improve the patient experience (1).

2. Erythropoiesis-stimulating agent (ESA) therapy in CKD patients should be based on the individual needs of the patient in order to maximize their well-being by alleviating significant symptoms of anemia and to avoid transfusions.

CWCr: "Do not administer ESAs to CKD patients with hemoglobin levels ≥10 g/dl without symptoms of anemia."

Since their introduction in 1989, ESAs have been used to treat the anemia of CKD. Use of ESAs initially focused on individuals with kidney failure treated with dialysis and was later extended to the predialysis CKD population. Small, early studies targeting modest rises in hemoglobin levels showed some improvements in well-being, quality

Table 1. American Society of Nephrology: five things physicians and patients should question

Number	Recommendation	Explanatory Statement
1	Don't perform routine cancer screening for dialysis patients with limited life expectancies without signs or symptoms.	Due to high mortality among ESRD patients, routine cancer screening—including mammography, colonoscopy, prostate-specific antigen testing, and Papanicolaou smears—in dialysis patients with limited life expectancy, such as those who are not transplant candidates, is not cost-effective and does not improve survival. False-positive test results can cause harm, including unnecessary procedures, overtreatment, misdiagnosis, and increased stress. An individualized approach to cancer screening incorporating patients' cancer risk factors, expected survival, and transplant status is required.
2	Don't administer erythropoiesis-stimulating agents (ESAs) to CKD patients with hemoglobin levels ≥10 g/dl without symptoms of anemia.	Administering ESAs to nondialysis CKD patients with the goal of normalizing hemoglobin levels has no demonstrated survival or cardiovascular disease benefit and may be harmful in comparison to a treatment regimen that delays ESA administration or sets relatively conservative targets (9–11 g/dl). ESAs should be prescribed to maintain hemoglobin at the lowest level that both minimizes transfusions and best meets individual patient needs.
3	Avoid nonsteroidal anti-inflammatory drugs (NSAIDS) in individuals with hypertension, heart failure, or CKD of all causes, including diabetes.	The use of NSAIDS, including cyclo-oxygenase type 2 inhibitors, for the pharmacologic treatment of musculoskeletal pain can elevate BP, make antihypertensive drugs less effective, cause fluid retention, and worsen kidney function in these individuals. Other agents, such as acetaminophen, tramadol, or narcotic analgesics (short-term use), may be safer than and as effective as NSAIDs.
4	Don't place peripherally inserted central catheters (PICCs) in stage 3–5 CKD patients without consulting nephrology.	Venous preservation is critical for stage 3–5 CKD patients. Arteriovenous fistulas (AVFs) are the best hemodialysis access, with fewer complications and lower patient mortality, versus grafts or central venous catheters. Excessive venous puncture damages veins, destroying potential AVF sites. PICC lines and subclavian vein puncture can cause venous thrombosis and central vein stenosis. Early nephrology consultation increases AVF use at hemodialysis initiation and may avoid unnecessary PICC lines or central or peripheral vein puncture.
5	Don't initiate chronic dialysis without ensuring a shared decision-making process between patients, their families, and their physicians.	The decision to initiate chronic dialysis should be part of an individualized, shared decision-making process between patients, their families, and their physicians. This process includes eliciting individual patient goals and preferences and providing information on prognosis and expected benefits and harms of dialysis within the context of these goals and preferences. Limited observational data suggest that survival may not differ substantially for older adults with a high burden of comorbidity who initiate chronic dialysis versus those managed conservatively.

of life, and physical function in those treated with ESAs (16,17); however, these initial studies did not examine the impact of higher hemoglobin targets on mortality or other outcomes (18). Over the past 15 years, several large studies designed with adequate power to examine mortality were conducted in patients with ESRD and predialysis CKD (19–22). These studies reported no survival benefit when ESAs were administered with the goal of "normalizing" hemoglobin to levels of approximately ≥13 g/dl versus control groups targeting hemoglobin levels in the 10–11 g/dl

range or, in the case of the Trial to Reduce Cardiovascular Events with Aranesp Therapy (TREAT), even lower hemoglobin levels. In fact, the more aggressive treatment strategies were associated with a higher incidence of adverse cardiovascular outcomes, in particular stroke (23).

After the publication of two landmark studies, the Kidney Disease Outcomes Quality Initiative (KDOQI) in 2007 recommended a hemoglobin target between 11 and 12 g/dl (24). However, after the 2009 publication of TREAT, the U.S. Food and Drug Administration (FDA) sought guidance from advisory committees on the proper use of ESAs. As of June 2011, the FDA has modified ESA package inserts to advise that the lowest possible dose of any ESA should be used to avoid blood transfusion as a treatment goal. These package inserts also state that no trial has identified a hemoglobin target level, ESA dose, or dosing strategy that does not increase these cardiovascular risks. On the basis of analysis of the existing data and the FDA recommendations, the QPS Task Force emphasized conservative ESA use in individuals with CKD: ESAs should not be administered to patients with CKD not treated with dialysis who have hemoglobin levels of ≥10 g/dl who do not have symptoms attributable to anemia.

ESA dosing remains an inexact practice, and the intent of this recommendation is to avoid initiating ESA therapy in nondialysis CKD patients with hemoglobin levels ≥10 g/dl and to discourage aggressive therapy in these patients once their hemoglobin levels rise above this threshold, assuming that significant symptoms attributable to anemia are not present. Accordingly, with limited conclusive data to guide providers, the risks and benefits of ESA therapy should be discussed with CKD patients in order to arrive at a shared decision on treatment options and goals. ESAs should be prescribed to maintain hemoglobin at the lowest level that both minimizes transfusions and best meets individual patient needs.

3. To protect kidney function and prevent adverse effects, the risks and benefits of nonsteroidal anti-inflammatory drugs (NSAIDs) should be discussed with all patients as they can raise BP, make antihypertensive therapy less effective, and worsen kidney function.

CWCr: "Avoid NSAIDs in individuals with hypertension, heart failure, or CKD of all causes, including diabetes."

In the United States, NSAIDs are the most frequently used medications for the treatment of osteoarthritis and mild to moderate pain. Approximately 70 million Americans regularly consume NSAIDs to manage pain, with annual sales of approximately $12 billion (25,26). According to the FDA, all NSAIDs should be used cautiously because they are associated with an increased risk for serious cardiovascular events, particularly among patients with risk factors for or established cardiovascular disease (27). Despite an estimated 16,500 NSAID-related deaths annually in the United States, among patients with chronic joint disease (28), many physicians and patients may be unaware of the potential deleterious effects of NSAIDs on BP, the heart, and the kidneys. This is compounded by the lack of awareness among patients with known CKD that they should reduce use of NSAIDs (29).

NSAIDs, including selective cyclooxygenase-2 inhibitors, can cause kidney damage in many ways, including the development of acute allergic interstitial nephritis, nephrotic syndrome, and, in particular, AKI due to predictable reductions in GFR, most often occurring in patients with preexisting CKD (30–33). Specifically, NSAIDs potentiate impairment in GFR autoregulation and potassium homeostasis seen with commonly used drugs that block the renin-angiotensin-aldosterone system, including angiotensin-converting enzyme inhibitors, angiotensin II type 1 receptor blockers, aldosterone receptor blockers, and renin inhibitors. These interactions can result in the development of AKI and hyperkalemia because of further reductions in GFR. High cumulative NSAID exposure has also been associated with an increased risk for rapid CKD progression in the elderly (33).

With the exception of low-dose aspirin (for its cardiovascular benefits), current clinical practice guidelines recommend avoidance of long-term use of NSAIDs in patients with preexisting hypertension (34), CKD (32,35), and heart failure (27,36). Indeed, the KDOQI clinical practice guidelines on CKD identify persons using NSAIDs daily to be at an increased risk for CKD (35). Similarly, the Kidney Disease Improving Global Outcomes' clinical practice guidelines for the care of kidney transplant recipients suggest avoiding NSAIDs and cyclooxygenase-2 inhibitors for the treatment of acute gout, a common complication of long-term therapy with calcineurin inhibitors, and suggest using colchicine with appropriate dose reduction for reduced kidney function (37).

NSAID use increases the risk for hypertension (38) and raises BP in patients with pre-existing hypertension. Increases in BP may be accompanied by edema and weight gain (34), in part because of a sodium-retentive state associated with loss of the natriuretic prostaglandin E_2. NSAID use is also associated with a requirement for more intensive hypertension therapy, especially in patients treated with angiotensin-converting enzyme inhibitors or angiotensin II type 1 receptor blockers (39). Finally, in patients with pre-existing heart failure, use of NSAIDs is associated with acute decompensation of heart failure due to similar salt-retentive mechanisms (40).

In summary, the use of NSAIDS, including COX-2 inhibitors, for the treatment of musculoskeletal pain can elevate BP, make antihypertensive drugs less effective, cause fluid retention, and worsen kidney function in individuals with heart disease, hypertension, and CKD of all causes, including diabetes. Other agents, such as acetaminophen, tramadol, or narcotic analgesics (short-term use) may be safer while being as effective as NSAIDs. The QPS Task Force recognizes that from patients' and physicians' perspectives, the challenge lies in balancing the risks and benefits of NSAID use for treatment of pain. Therefore, the QPS Task Force strongly suggests that if an over-the-counter NSAID is self-prescribed for >3–5 days, patients at high risk (including individuals with hypertension, CKD, and heart failure) should be encouraged to consult with their physicians to discuss symptoms, risks of therapies, and alternative solutions.

4. Preserving veins for future creation of an arteriovenous fistula (AVF) is paramount to ensure better outcomes for patients with CKD who may eventually need HD.

CWCr: "Do not place peripherally inserted central venous catheters (PICCs) in stage 3–5 CKD patients without consulting nephrology."

Preserving peripheral and central veins is critical in many patients with CKD stages 3–5 in order to ensure future adequate vascular access for HD if the need arises. Patent veins are essential for obtaining the best type of vascular access, the AVF. An AVF has better patency rates and fewer complications compared with a graft or catheter. In addition, evidence shows a direct correlation of mortality with the type of access at the start of dialysis, and patients with an AVF have a lower mortality than patients with a central venous catheter (CVC) (41). Although data showing higher mortality among patients with a CVC at initiation of HD may reflect the greater complexity or acuity of presentation of some of these patients, optimal patient care should include planning ahead to preserve the integrity of veins that may be used to construct an AVF. This will help to ensure the availability of a mature AVF when HD is initiated.

The Centers for Medicare and Medicaid Services set the prevalent AVF rate of 66% as a national standard in 2003. Despite this recommendation, >70% of incident and almost 30% of prevalent patients treated with maintenance HD use a tunneled central venous catheter for vascular access (42–44). Moreover, CVC-related complications are a major cause of morbidity and mortality in HD patients. According to the Dialysis Outcomes and Practice Patterns Study, dialysis patients with a tunneled CVC have a five-fold increased risk of developing infection compared with patients with an AVF (45).

PICCs, subclavian vein puncture, and excessive phlebotomy damage veins and destroy future sites for HD vascular access. In 2000, Allen *et al.* performed a prospective study evaluating the incidence of central vein stenosis with the use of PICCs (46). These authors performed venography before and after 364 PICC placements in 119 patients and describe a 38% incidence of venous thrombosis associated with use of PICCs. No significant differences were noted in the rate of this complication by age, sex, duration of catheter use, or catheter size. Gonsalves *et al.* (47) performed a similar retrospective review of central vein venography before and after PICC and port placement in 154 patients. They showed a 42% incidence of central vein stenosis in patients who had a PICC or CVC. If prolonged venous access is required, a tunneled internal jugular vein catheter is the preferred access in patients with advanced CKD because it is associated with a lower risk for permanent vascular damage.

Only four veins in the upper extremities are suitable for AVF placement. Because the subclavian vein drains the entire upper extremity, the formation of subclavian vein stenosis could exclude all veins in the ipsilateral limb for future vascular access placement. Studies have shown a 46%–100% incidence of stenosis after subclavian vein puncture (48–50) that is unrelated to the duration or size of the catheter. Specifically in dialysis patients, prior PICC use is a strong, independent predictor of not having a functioning AVF (odds ratio, 2.8 [95% confidence interval, 1.5–5.5]) (51).

Accordingly, it is critical to preserve all veins that can be used to construct an AVF in individuals with advanced CKD for whom there is even a modest likelihood that dialysis will be required in the future. In addition to avoiding PICC and subclavian vein puncture, and to increase the success of AVF placement and maturation, it is recommended that the nondominant arm be protected from blood draws and intravenous cannulation and that only the dorsum of the hand be used in patients with even a moderate likelihood of requiring kidney replacement therapy. We suggest that special attention regarding protection of veins be given to younger individuals with estimated GFR <60 ml/min per 1.73 m^2 and older individuals with estimated GFR <45 ml/min per 1.73 m^2, depending on risk for progression versus death. Education of both patients and health care professionals is required to promote awareness of this problem. The goal should be to protect veins and preserve valuable vascular access "real estate" in patients with CKD.

To promote this objective, the QPS Task Force recommends that all patients with CKD be referred to a nephrologist when appropriate. Patients who should be referred include those with an estimated GFR of ≤30 ml/min per 1.73 m^2, rapid progressors with higher estimated GFR, or those in clinical scenarios where a decision may have significant future consequences and requires careful balancing of current benefits versus future risks. Because HD is the most common kidney replacement therapy, and is often required even in individuals electing peritoneal dialysis, nephrologists should educate all patients with CKD about the need to protect veins for future access procedures. They should also interact with other health care providers to raise awareness and design protocols that avoid unnecessary use of PICCs or central or peripheral vein puncture. Although no KDOQI guidelines specifically address the optimal timing of referral of children to a pediatric nephrologist, early referral may be especially important for infants, children, and adolescents because of the rarity of their disease and their need for subspecialty care. This approach, with its emphasis on increased awareness and conversations between providers and between providers and patients, should result in more widespread successful AVF use at HD initiation and improve clinical outcomes in patients with CKD.

5. Before initiation of kidney replacement therapy, there should be a shared decision-making process among patients, family members, and providers whereby patients (or their proxy) learn about their prognosis and the potential benefits and harms of therapy and share their values, goals, and preferences.

CWCr: "Do not initiate chronic dialysis without ensuring a shared decision-making process among patients, their families, and their physicians."

Chronic dialysis is an intensive therapy intended to prolong life and treat uremic symptoms in patients with advanced kidney disease. Initiation of maintenance dialysis has major implications for patients and their families as well as for the health care system as a whole. HD treatments performed in an outpatient dialysis unit generally take up to 12 hours per week, not including travel to and from the dialysis facility. This time commitment can be more significant if the patient requires more frequent or longer dialysis sessions. Home dialysis modalities may require the patient to dialyze up to 6 days a week during the day (short daily HD), at night (nocturnal dialysis), or every night or day (peritoneal dialysis). Although the home modalities may be associated with shorter daily commitments and less travel times, these modalities transfer most if

not all of the responsibility of the dialysis procedure to the patient and family. All of these aspects may increase the patient's total burden of disease. Chronic dialysis is also costly, and the care of Medicare beneficiaries receiving long-term dialysis accounts for a disproportionate share of total Medicare expenditures (52,53).

The incidence of ESRD varies worldwide (54,55), perhaps suggesting that the decision to initiate long-term dialysis is often shaped more by provider- and system-level factors than by patient preferences. This hypothesis is supported by qualitative work in outpatient nephrology clinics, suggesting that chronic dialysis is often presented to patients as a necessity instead of a treatment choice (56). Surveys among nephrologists suggest that many do not feel comfortable talking with patients about end-of-life treatment preferences, and few programs in the United States have well developed conservative care pathways (57). When asked, after the fact, about the decision to initiate chronic dialysis, a substantial number of patients express regret about this decision, with 24%–34% of those 75 years of age and older ultimately discontinuing maintenance dialysis prior to death (58–60). Decision-making around dialysis initiation is further complicated by uncertainty and variability in disease trajectories and the absence of tools to reliably identify patients who will develop advanced kidney disease during their remaining lifetime (61). Many ultimately initiate chronic dialysis in the hospital in the setting of an acute and unexpected decline in renal function (62).

Over the past decade, the estimated GFR at which dialysis is initiated has been rising (63). Although this trend may reflect changes in the composition of the dialysis population, a similar pattern is present across a wide range of different patient subgroups (64), perhaps suggesting that dialysis is being initiated earlier in the course of kidney disease. At the same time, the incidence of treated ESRD in older adults has been increasing, with the largest percentage increase occurring in the very old (65). Among these older patients, life expectancy after initiation of chronic dialysis is quite limited (65–67), and many experience loss of functional status and independence (67,68). A recent randomized, controlled trial suggests that among patients receiving close follow-up from a nephrologist, earlier initiation of chronic dialysis does not improve survival or other outcomes (69), and may add to health care costs (70) without a corresponding quality of life benefit. Limited observational data suggest that in older patients with a high burden of comorbidity, survival may not differ greatly between those who initiate chronic dialysis and those who are managed conservatively (71,72). Other work suggests that although survival may be superior among older patients who initiate chronic dialysis compared with those managed conservatively, much of the time gained will be spent in a health care setting (73).

Care decisions for infants with severe congenital renal anomalies present similar challenges because many have life-limiting extrarenal comorbid conditions, such as pulmonary hypoplasia and cerebral dysfunction. The latter account for 1-year mortality rates in the range of 50% if chronic dialysis is initiated within the first 28 days of life (74,75) and 2.7-fold higher mortality rates when begun before age 5 years (76). In sharp contrast, outcomes for infants with isolated severe nonoliguric CKD have dramatically improved over the past two decades (77).

Although the aforementioned data refer to the elderly and very young with significant life-limiting comorbid diseases rather than individuals with less complex comorbid conditions or the majority of those treated with kidney replacement therapies (age 45–64 years [3]), these findings highlight the importance of individualized shared decision-making for all patients approaching the advanced stages of kidney disease (78,79). The shared decision-making process allows for incorporation of both patient and provider perspectives and allows patients (or their surrogates) and providers to share responsibility for medical decisions.

Fundamental to shared decision-making is establishing and developing a relationship between the patient (or surrogate) and the provider. Ideally this process occurs in an interactive fashion over time in order to accommodate changes in patient and provider understanding of illness trajectory and prognosis and patient health status and preferences. Without this process, patients (or their surrogates) may lack the information they need to make an informed treatment decision, and providers may lack sufficient knowledge of patients' values, goals, and preferences. It may be useful to frame discussions about dialysis initiation and other related treatment decisions (*e.g.*, choice of dialysis modality, time-limited trial of dialysis, access placement, referral for transplant) within a more general process of advance care planning. Additionally, to provide a broader context for these discussions, this approach may also strengthen the process of advance care planning by grounding theoretical discussions about future health states and treatment preferences in the reality of the patient's evolving experience of illness. Although few studies examine advance care planning in patients with earlier stages of CKD, Kirchhoff *et al.* tested a patient-centered disease-specific approach to advanced care planning among patients with heart failure and ESRD using the Respecting Choices framework (80). These authors found the program led to greater understanding of preferences between patients and their surrogates and resulted in end-of-life care that was more congruent with patient preferences.

Detailed information on shared decision-making as it pertains to decisions about dialysis initiation is found in the Renal Physicians Association and ASN's recommendation in "Shared Decision-Making in the Appropriate Initiation of and Withdrawal from Dialysis" (81) and the recent update of this guideline by the Renal Physicians Association (82). This will help patients, their families, and physicians develop treatment decisions that reflect individual patient goals and preferences and discuss prognosis and expected benefits and harms of dialysis within the context of these goals and preferences.

Other Selected Recommendations under Consideration

While the "Choosing Wisely" campaign requested that participating societies submit only five tests, procedures, or therapies that are sometimes used unnecessarily or may potentially cause harm, the ASN QPS Task Force identified many others relevant to improving the care of patients with kidney disease.

One of the recommendations ranked highly by the Task Force was not to measure urine microalbumin if the result

of the urine dipstick test for protein is positive. Urinary protein excretion is widely assessed, and the test is important in determining the etiology of kidney disease as well as the risks of progression of kidney disease and of developing cardiovascular disease (83). Normal levels of urinary albumin excretion are <30 mg/d or approximately 30 mg/L on dipstick testing; if determined by a urinary albumin-to-creatinine ratio, normal values are 30 mg/g for women and 20 mg/g for men. Levels between 30–300 mg/L (albumin-to-creatinine ratio, 30 mg/g [women] or 20 mg/g [men] to 300 mg/g) are referred to as microalbuminuria. The standard urinary dipstick test measures albumin rather than other proteins, and a positive test result indicates an albumin level of 300 mg/L. Therefore, if the dipstick result is positive for albumin, the albumin level in the sample is at least 300 mg/L. Because the test measures albumin and the result becomes positive only if the urinary albumin excretion is 300 mg/L, a positive dipstick result clearly indicates more than microalbuminuria (30–300 mg/L), and further assessment for urinary microalbumin excretion is not warranted.

The Task Force also identified the determination of the serum erythropoietin concentration as a test often used unnecessarily in evaluating anemia in individuals with CKD and ESRD. Serum erythropoietin deficiency is often relative and, in advanced CKD, usually does not correlate with the degree of anemia (84,85). Even in patients with kidney failure treated with dialysis, the ability to upregulate erythropoietin production in response to acute anemia is preserved (86,87). Accordingly, because the assessment of the serum erythropoietin concentration provides results that are not readily interpretable in patients with advanced CKD and are unlikely to affect care, there is no role for assessing this marker in this patient population (88).

Conclusion

A total of 45 recommendations from the initial nine subspecialty medical organizations were included in the April 4, 2012, "Choosing Wisely" campaign (1). The critical trusted conversation between the patient and the health care team is the essential step to success in improving care and using health care resources appropriately. The five recommendations developed by the ASN QPS Task Force for the "Choosing Wisely" campaign should help prompt and encourage conversations between patients and care teams and lead to a mutual understanding of the risks, benefits, and impact on the patient's overall outcome.

Studies have shown that patients want to know the data about health care options, including benefits, risks, and likely outcomes (58). Individuals with acute and chronic kidney disease are among the most complex patients requiring ongoing medical evaluation and care. Educating these individuals about their health care options will empower them to initiate and actively participate in decisions that determine their care. Shared decision-making focused on the patient's health and quality-of-life goals should improve patient satisfaction and outcomes and decrease unnecessary health care spending. ASN's top five recommendations reflect the society's goal of improving care for patients with all stages of kidney disease. The "Choosing Wisely" campaign is an effective means to widely distribute a consistent message to health care providers and patients about common but not always necessary tests, procedures, and therapies and reflects ASN's focus on improving the value of care for all patients with kidney disease.

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References

1. ABIM Foundation: Choosing Wisely. Available at: http://choosingwisely.org/. Accessed May 12, 2012
2. American Society of Nephrology: Methodology Used to Create ASN's List. Available at: http://www.asn-online.org/policy_and_public_affairs/choosingwisely/ChoosingWiselyMethodology.pdf. Accessed May 12, 2012
3. Terret C, Castel-Kremer E, Albrand G, Droz JP: Effects of comorbidity on screening and early diagnosis of cancer in elderly people. *Lancet Oncol* 10: 80–87, 2009
4. United States Renal Data System: USRDS 2011 Annual Data Report: Atlas of Chronic Kidney Disease and End-Stage Renal Disease in the Unites States. National Institute of Diabetes and Digestive and Kidney Diseases. Available at: http://www.usrds.org/adr.aspx. Accessed May 12, 2012
5. Maisonneuve P, Agodoa L, Gellert R, Stewart JH, Buccianti G, Lowenfels AB, Wolfe RA, Jones E, Disney AP, Briggs D, McCredie M, Boyle P: Cancer in patients on dialysis for end-stage renal disease: An international collaborative study. *Lancet* 354: 93–99, 1999
6. Chertow GM, Paltiel AD, Owen WF Jr, Lazarus JM: Cost-effectiveness of cancer screening in end-stage renal disease. *Arch Intern Med* 156: 1345–1350, 1996
7. LeBrun CJ, Diehl LF, Abbott KC, Welch PG, Yuan CM: Life expectancy benefits of cancer screening in the end-stage renal disease population. *Am J Kidney Dis* 35: 237–243, 2000
8. Kajbaf S, Nichol G, Zimmerman D: Cancer screening and life expectancy of Canadian patients with kidney failure. *Nephrol Dial Transplant* 17: 1786–1789, 2002
9. de Koning HJ, van Ineveld BM, van Oortmarssen GJ, de Haes JC, Collette HJ, Hendriks JH, van der Maas PJ: Breast cancer screening and cost-effectiveness: Policy alternatives, quality of life considerations and the possible impact of uncertain factors. *Int J Cancer* 49: 531–537, 1991
10. Wong G, Howard K, Chapman JR, Craig JC: Cost-effectiveness of breast cancer screening in women on dialysis. *Am J Kidney Dis* 52: 916–929, 2008
11. Irwig L, McCaffery K, Salkeld G, Bossuyt P: Informed choice for screening: Implications for evaluation. *BMJ* 332: 1148–1150, 2006
12. Castellanos M, Varma S, Ahern K, Grosso SJ, Buchbinder S, D'Angelo D, Raia C, Kleiner M, Elsayegh S: Increased breast calcifications in women with ESRD on dialysis: Implications for breast cancer screening. *Am J Kidney Dis* 48: 301–306, 2006
13. Kasiske BL, Vazquez MA, Harmon WE, Brown RS, Danovitch GM, Gaston RS, Roth D, Scandling JD, Singer GG; American Society of Transplantation: Recommendations for the outpatient surveillance of renal transplant recipients. *J Am Soc Nephrol* 11[Suppl 15]: S1–S86, 2000
14. EBPG Expert Group on Renal Transplantation. European best practice guidelines for renal transplantation. Section IV: Long-term management of the transplant recipient. IV.1. Organization of follow-up of transplant patients after the first year. *Nephrol Dial Transplant*17 Suppl 4:3–4, 2002.
15. Wong G, Howard K, Tong A, Craig JC: Cancer screening in people who have chronic disease: The example of kidney disease. *Semin Dial* 24: 72–78, 2011
16. Canadian Erythropoietin Study Group: Association between recombinant human erythropoietin and quality of life and exercise capacity of patients receiving haemodialysis. *BMJ* 300: 573–578, 1990
17. The US Recombinant Human Erythropoietin Predialysis Study Group: Double-blind, placebo-controlled study of the

therapeutic use of recombinant human erythropoietin for anemia associated with chronic renal failure in predialysis patients. *Am J Kidney Dis* 18: 50–59, 1991
18. Weiner DE, Miskulin DC: Anemia management in chronic kidney disease: Bursting the hemoglobin bubble. *Ann Intern Med* 153: 53–55, 2010
19. Besarab A, Bolton WK, Browne JK, Egrie JC, Nissenson AR, Okamoto DM, Schwab SJ, Goodkin DA: The effects of normal as compared with low hematocrit values in patients with cardiac disease who are receiving hemodialysis and epoetin. *N Engl J Med* 339: 584–590, 1998
20. Drüeke TB, Locatelli F, Clyne N, Eckardt KU, Macdougall IC, Tsakiris D, Burger HU, Scherhag A; CREATE Investigators: Normalization of hemoglobin level in patients with chronic kidney disease and anemia. *N Engl J Med* 355: 2071–2084, 2006
21. Pfeffer MA, Burdmann EA, Chen CY, Cooper ME, de Zeeuw D, Eckardt KU, Feyzi JM, Ivanovich P, Kewalramani R, Levey AS, Lewis EF, McGill JB, McMurray JJ, Parfrey P, Parving HH, Remuzzi G, Singh AK, Solomon SD, Toto R; TREAT Investigators: A trial of darbepoetin alfa in type 2 diabetes and chronic kidney disease. *N Engl J Med* 361: 2019–2032, 2009
22. Singh AK, Szczech L, Tang KL, Barnhart H, Sapp S, Wolfson M, Reddan D; CHOIR Investigators: Correction of anemia with epoetin alfa in chronic kidney disease. *N Engl J Med* 355: 2085–2098, 2006
23. Palmer SC, Navaneethan SD, Craig JC, Johnson DW, Tonelli M, Garg AX, Pellegrini F, Ravani P, Jardine M, Perkovic V, Graziano G, McGee R, Nicolucci A, Tognoni G, Strippoli GF: Meta-analysis: Erythropoiesis-stimulating agents in patients with chronic kidney disease. *Ann Intern Med* 153: 23–33, 2010
24. KDOQI. KDOQI Clinical Practice Guideline and Clinical Practice Recommendations for anemia in chronic kidney disease: 2007 update of hemoglobin target. *Am J Kidney Dis* 50(3): 471–530, 2007
25. American College of Rheumatology. Information for patients about NSAIDs. June 2007. Available at: http://www.rheumatology.org/practice/clinical/patients/medications/nsaids.pdf. Accessed May 8, 2012
26. Pugner KM, Scott DI, Holmes JW, Hieke K: The costs of rheumatoid arthritis: an international long-term view. *Semin Arthritis Rheum* 29: 305–320, 2000
27. Antman EM, Bennett JS, Daugherty A, Furberg C, Roberts H, Taubert KA; American Heart Association: Use of nonsteroidal antiinflammatory drugs: an update for clinicians: A scientific statement from the American Heart Association. *Circulation* 115: 1634–1642, 2007
28. Wolfe MM, Lichtenstein DR, Singh G: Gastrointestinal toxicity of nonsteroidal antiinflammatory drugs. *N Engl J Med* 340: 1888–1899, 1999
29. Plantinga L, Grubbs V, Sarkar U, Hsu CY, Hedgeman E, Robinson B, Saran R, Geiss L, Burrows NR, Eberhardt M, Powe N; CDC CKD Surveillance Team: Nonsteroidal anti-inflammatory drug use among persons with chronic kidney disease in the United States. *Ann Fam Med* 9: 423–430, 2011
30. Pugliese F, Cinotti GA: Nonsteroidal anti-inflammatory drugs (NSAIDs) and the kidney. *Nephrol Dial Transplant* 12: 386–388, 1997
31. Bouvy ML, Heerdink ER, Hoes AW, Leufkens HG: Effects of NSAIDs on the incidence of hospitalisations for renal dysfunction in users of ACE inhibitors. *Drug Saf* 26: 983–989, 2003
32. The Renal Association. *Chronic kidney disease in adults: UK guidelines for identification*, management and referral. 2006. Available at:http://www.renal.org/ckdguide/full/ukckdfull.pdf. Accessed August 25, 2012
33. Gooch K, Culleton BF, Manns BJ, Zhang J, Alfonso H, Tonelli M, Frank C, Klarenbach S, Hemmelgarn BR: NSAID use and progression of chronic kidney disease. *Am J Med*120:280 e281–287, 2007
34. National Heart, Lung, and Blood Institute, U.S. Department of Health and Human Services. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7). 2007. Available at: http://www.nhlbi.nih.gov/guidelines/hypertension/. Accessed May 8, 2012
35. National Kidney Foundation: KDOQI clinical practice guidelines for chronic kidney disease: evaluation, classificaiton and stratification. *Am J Kidney Dis* 39(2 Suppl 1):S1–266, 2002
36. Scottish Intercollegiate Guidelines Network (SIGN): Management of chronic heart failure: A national clinical guideline. 2007. Available at:http://www.sign.ac.uk/pdf/sign95.pdf. Accessed May 8, 2012
37. Kasiske BL, Zeier MG, Chapman JR, Craig JC, Ekberg H, Garvey CA, Green MD, Jha V, Josephson MA, Kiberd BA, Kreis HA, McDonald RA, Newmann JM, Obrador GT, Vincenti FG, Cheung M, Earley A, Raman G, Abariga S, Wagner M, Balk EM; Kidney Disease: Improving Global Outcomes: KDIGO clinical practice guideline for the care of kidney transplant recipients: A summary. *Kidney Int* 77: 299–311, 2010
38. Forman JP, Rimm EB, Curhan GC: Frequency of analgesic use and risk of hypertension among men. *Arch Intern Med* 167: 394–399, 2007
39. Fournier JP, Sommet A, Bourrel R, Oustric S, Pathak A, Lapeyre-Mestre M, Montastruc JL: Non-steroidal anti-inflammatory drugs (NSAIDs) and hypertension treatment intensification: A population-based cohort study[published online ahead of print April 15, 2012]. *Eur J Clin Pharmacol* doi: 10.1007/s00228-012-1283-9
40. Feenstra J, Heerdink ER, Grobbee DE, Stricker BH: Association of nonsteroidal anti-inflammatory drugs with first occurrence of heart failure and with relapsing heart failure: The Rotterdam Study. *Arch Intern Med* 162: 265–270, 2002
41. Hoggard J, Saad T, Schon D, Vesely TM, Royer T; American Society of Diagnostic and Interventional Nephrology, Clinical Practice Committee; Association for Vascular Access: Guidelines for venous access in patients with chronic kidney disease. A Position Statement from the American Society of Diagnostic and Interventional Nephrology, Clinical Practice Committee and the Association for Vascular Access. *Semin Dial* 21: 186–191, 2008
42. Allon M: Dialysis catheter-related bacteremia: treatment and prophylaxis. *Am J Kidney Dis* 44: 779–791, 2004
43. Lee T, Barker J, Allon M: Tunneled catheters in hemodialysis patients: Reasons and subsequent outcomes. *Am J Kidney Dis* 46: 501–508, 2005
44. Nori US, Manoharan A, Yee J, Besarab A: Comparison of low-dose gentamicin with minocycline as catheter lock solutions in the prevention of catheter-related bacteremia. *Am J Kidney Dis* 48: 596–605, 2006
45. Rayner HC, Besarab A, Brown WW, Disney A, Saito A, Pisoni RL: Vascular access results from the Dialysis Outcomes and Practice Patterns Study (DOPPS): Performance against Kidney Disease Outcomes Quality Initiative (K/DOQI) Clinical Practice Guidelines. *Am J Kidney Dis* 44[Suppl 2]: 22–26, 2004
46. Allen AW, Megargell JL, Brown DB, Lynch FC, Singh H, Singh Y, Waybill PN: Venous thrombosis associated with the placement of peripherally inserted central catheters. *J Vasc Interv Radiol* 11: 1309–1314, 2000
47. Gonsalves CF, Eschelman DJ, Sullivan KL, DuBois N, Bonn J: Incidence of central vein stenosis and occlusion following upper extremity PICC and port placement. *Cardiovasc Intervent Radiol* 26: 123–127, 2003
48. Barrett N, Spencer S, McIvor J, Brown EA: Subclavian stenosis: A major complication of subclavian dialysis catheters. *Nephrol Dial Transplant* 3: 423–425, 1988
49. Schwab SJ, Quarles LD, Middleton JP, Cohan RH, Saeed M, Dennis VW: Hemodialysis-associated subclavian vein stenosis. *Kidney Int* 33: 1156–1159, 1988
50. Spinowitz BS, Galler M, Golden RA, Rascoff JH, Schechter L, Held B, Charytan C: Subclavian vein stenosis as a complication of subclavian catheterization for hemodialysis. *Arch Intern Med* 147: 305–307, 1987
51. El Ters M, Schears GJ, Taler SJ, Williams AW, Albright RC, Jenson BM, Mahon AL, Stockland AH, Misra S, Nyberg SL, Rule AD, Hogan MC: Association between prior peripherally inserted central catheters and lack of functioning arteriovenous fistulas: A case-control study in hemodialysis patients [Epub ahead of print June 14, 2012]. *Am J Kidney Dis* doi:10.1053/j.ajkd.2012.05.007
52. Mau LW, Liu J, Qiu Y, Guo H, Ishani A, Arneson TJ, Gilbertson DT, Dunning SC, Collins AJ: Trends in patient characteristics and first-year medical costs of older incident hemodialysis patients, 1995-2005. *Am J Kidney Dis* 55: 549–557, 2010

53. Knauf F, Aronson PS: ESRD as a window into America's cost crisis in health care. *J Am Soc Nephrol* 20: 2093–2097, 2009
54. O'Hare AM, Rodriguez RA, Hailpern SM, Larson EB, Kurella Tamura M: Regional variation in health care intensity and treatment practices for end-stage renal disease in older adults. *JAMA* 304: 180–186, 2010
55. Hallan SI, Coresh J, Astor BC, Asberg A, Powe NR, Romundstad S, Hallan HA, Lydersen S, Holmen J: International comparison of the relationship of chronic kidney disease prevalence and ESRD risk. *J Am Soc Nephrol* 17: 2275–2284, 2006
56. Kaufman SR, Shim JK, Russ AJ: Old age, life extension, and the character of medical choice. *J Gerontol B Psychol Sci Soc Sci* 61: S175–S184, 2006
57. Davison SN, Jhangri GS, Holley JL, Moss AH: Nephrologists' reported preparedness for end-of-life decision-making. *Clin J Am Soc Nephrol* 1: 1256–1262, 2006
58. Davison SN: End-of-life care preferences and needs: Perceptions of patients with chronic kidney disease. *Clin J Am Soc Nephrol* 5: 195–204, 2010
59. Murtagh F, Cohen LM, Germain MJ: Dialysis discontinuation: Quo vadis? *Adv Chronic Kidney Dis* 14: 379–401, 2007
60. Collins AJ, Foley RN, Herzog C, Chavers B, Gilbertson D, Ishani A, Kasiske B, Liu J, Mau LW, McBean M, Murray A, St Peter W, Guo H, Li Q, Li S, Li S, Peng Y, Qiu Y, Roberts T, Skeans M, Snyder J, Solid C, Wang C, Weinhandl E, Zaun D, Arko C, Chen SC, Dalleska F, Daniels F, Dunning S, Ebben J, Frazier E, Hanzlik C, Johnson R, Sheets D, Wang X, Forrest B, Constantini E, Everson S, Eggers P, Agodoa L: United States Renal Data System 2008 Annual Data Report. *Am J Kidney Dis* 53[Suppl]: S1–S374, 2009
61. Schell JO, Patel UD, Steinhauser KE, Ammarell N, Tulsky JA: Discussions of the kidney disease trajectory by elderly patients and nephrologists: A qualitative study. *Am J Kidney Dis* 59: 495–503, 2012
62. O'Hare AM, Batten A, Burrows NR, Pavkov ME, Taylor L, Gupta I, Todd-Stenberg J, Maynard C, Rodriguez RA, Murtagh FE, Larson EB, Williams DE: Trajectories of kidney function decline in the 2 years before initiation of long-term dialysis. *Am J Kidney Dis* 59: 513–522, 2012
63. Rosansky SJ, Clark WF, Eggers P, Glassock RJ: Initiation of dialysis at higher GFRs: Is the apparent rising tide of early dialysis harmful or helpful? *Kidney Int* 76: 257–261, 2009
64. O'Hare AM, Choi AI, Boscardin WJ, Clinton WL, Zawadzki I, Hebert PL, Kurella Tamura M, Taylor L, Larson EB: Trends in timing of initiation of chronic dialysis in the United States. *Arch Intern Med* 171: 1663–1669, 2011
65. Kurella M, Covinsky KE, Collins AJ, Chertow GM: Octogenarians and nonagenarians starting dialysis in the United States. *Ann Intern Med* 146: 177–183, 2007
66. Jassal SV, Trpeski L, Zhu N, Fenton S, Hemmelgarn B: Changes in survival among elderly patients initiating dialysis from 1990 to 1999. *CMAJ* 177: 1033–1038, 2007
67. Kurella Tamura M, Covinsky KE, Chertow GM, Yaffe K, Landefeld CS, McCulloch CE: Functional status of elderly adults before and after initiation of dialysis. *N Engl J Med* 361: 1539–1547, 2009
68. Jassal SV, Chiu E, Hladunewich M: Loss of independence in patients starting dialysis at 80 years of age or older. *N Engl J Med* 361: 1612–1613, 2009
69. Cooper BA, Branley P, Bulfone L, Collins JF, Craig JC, Fraenkel MB, Harris A, Johnson DW, Kesselhut J, Li JJ, Luxton G, Pilmore A, Tiller DJ, Harris DC, Pollock CA; IDEAL Study: A randomized, controlled trial of early versus late initiation of dialysis. *N Engl J Med* 363: 609–619, 2010
70. Harris A, Cooper BA, Li JJ, Bulfone L, Branley P, Collins JF, Craig JC, Fraenkel MB, Johnson DW, Kesselhut J, Luxton G, Pilmore A, Rosevear M, Tiller DJ, Pollock CA, Harris DC: Cost-effectiveness of initiating dialysis early: A randomized controlled trial. *Am J Kidney Dis* 57: 707–715, 2011
71. Murtagh FE, Marsh JE, Donohoe P, Ekbal NJ, Sheerin NS, Harris FE: Dialysis or not? A comparative survival study of patients over 75 years with chronic kidney disease stage 5. *Nephrol Dial Transplant* 22: 1955–1962, 2007
72. Chandna SM, Da Silva-Gane M, Marshall C, Warwicker P, Greenwood RN, Farrington K: Survival of elderly patients with stage 5 CKD: Comparison of conservative management and renal replacement therapy. *Nephrol Dial Transplant* 26: 1608–1614, 2011
73. Carson RC, Juszczak M, Davenport A, Burns A: Is maximum conservative management an equivalent treatment option to dialysis for elderly patients with significant comorbid disease? *Clin J Am Soc Nephrol* 4: 1611–1619, 2009
74. Rheault MN, Rajpal J, Chavers B, Nevins TE: Outcomes of infants <28 days old treated with peritoneal dialysis for end-stage renal disease. *Pediatr Nephrol* 24: 2035–2039, 2009
75. Rees L: Management of the neonate with chronic renal failure. *Semin Fetal Neonatal Med* 13: 181–188, 2008
76. Shroff R, Rees L, Trompeter R, Hutchinson C, Ledermann S: Long-term outcome of chronic dialysis in children. *Pediatr Nephrol* 21: 257–264, 2006
77. Mehler K, Beck BB, Kaul I, Rahimi G, Hoppe B, Kribs A: Respiratory and general outcome in neonates with renal oligohydramnios—a single-centre experience. *Nephrol Dial Transplant* 26: 3514–3522, 2011
78. Barry MJ, Edgman-Levitan S: Shared decision making—pinnacle of patient-centered care. *N Engl J Med* 366: 780–781, 2012
79. Germain MJ, Davison SN, Moss AH: When enough is enough: The nephrologist's responsibility in ordering dialysis treatments. *Am J Kidney Dis* 58: 135–143, 2011
80. Kirchhoff KT, Hammes BJ, Kehl KA, Briggs LA, Brown RL: Effect of a disease-specific advance care planning intervention on end-of-life care. *J Am Geriatr Soc* 60: 946–950, 2012
81. American Society of Nephrology and Renal Physicians Association: Shared decision-making in the appropriate initiation of and withdrawal from dialysis, Washington, DC, Renal Physicians Association,2000
82. Renal Physicians Association: Shared decision-making in the appropriate initiation of and withdrawal from dialysis, 2nd Ed., Rockville, MD, 2010
83. Weir MR: Microalbuminuria and cardiovascular disease. *Clin J Am Soc Nephrol* 2: 581–590, 2007
84. Artunc F, Risler T: Serum erythropoietin concentrations and responses to anaemia in patients with or without chronic kidney disease. *Nephrol Dial Transplant* 22: 2900–2908, 2007
85. Fehr T, Ammann P, Garzoni D, Korte W, Fierz W, Rickli H, Wüthrich RP: Interpretation of erythropoietin levels in patients with various degrees of renal insufficiency and anemia. *Kidney Int* 66: 1206–1211, 2004
86. Kato A, Hishida A, Kumagai H, Furuya R, Nakajima T, Honda N: Erythropoietin production in patients with chronic renal failure. *Ren Fail* 16: 645–651, 1994
87. Ross RP, McCrea JB, Besarab A: Erythropoietin response to blood loss in hemodialysis patients in blunted but preserved. *ASAIO J* 40: M880–M885, 1994
88. KDOQI clinical practice guidelines and clinical practice recommendations for anemia in chronic kidney disease: *Am J Kidney Dis* 47: S11–S145, 2006

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