

Identifying Outcomes Important to Patients with Glomerular Disease and Their Caregivers

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Identifying outcomes important to patients with glomerular disease and their caregivers

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ABSTRACT

Background and objectives: Shared decision-making in patients with glomerular disease remains challenging because outcomes important to patients remain largely unknown. We aimed to identify and prioritize outcomes important to patients and caregivers, and to describe reasons for their choices.

Design, setting, participants, and measurements: We purposively sampled adult patients with glomerular disease and their caregivers from Australia, Hong Kong, the United Kingdom and the United States. Participants identified, discussed and ranked outcomes in focus groups using the nominal group technique; a relative importance score (between 0 and 1) was calculated. Qualitative data were analyzed thematically.

Results: Across 16 focus groups, 134 participants (range 19-85 years; 51% female), including 101 patients and 33 caregivers, identified 58 outcomes. The ten highest ranked outcomes were kidney function (importance score 0.42), mortality (0.29), dialysis or transplant requirement (0.22), life participation (0.18), fatigue (0.17), anxiety (0.13), family impact (0.12), infection and immunity (0.12), ability to work (0.11) and blood pressure (0.11). Three themes explained the reasons for these rankings: constraining day-to-day experience, impaired agency and control over health, and threats to future health and family.

Conclusions: Patients with glomerular disease and their caregivers highly prioritize kidney health and survival, but also life participation, fatigue, anxiety and family impact.

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INTRODUCTION

The management of glomerular disease can be challenging because of the heterogeneity and unpredictability of the disease course. Moreover, there is uncertainty about what outcomes of the disease and its treatment are most important to patients. Patients with glomerular disease may experience kidney failure (1, 2), bone disease (3), cancer (4-6), infertility (7, 8), fatigue, swelling (9-11), impaired psychosocial wellbeing (9, 11, 12) and reduced life expectancy (13-15). In weighing treatment options, decision-makers require comprehensive information about all relevant harms and benefits. Many of these outcomes, particularly patient-reported outcomes, are highly relevant yet under-reported in trials in glomerular disease, which limits informed decision-making (16-18).

Instead, trials frequently report biochemical or clinical outcomes selected by researchers with little or no patient involvement (19-21). Scant attention has been paid to patient-reported outcomes that reflect how patients feel and function (22, 23), even though symptoms such as swelling, fatigue and depression are often identified by patients as major concerns (10, 11, 24, 25). Life participation, defined as the ability to do meaningful activities in life, has been identified as an important outcome for people receiving peritoneal dialysis or living with a kidney transplant (26, 27). Patients may also experience distressing treatment-related side effects such as weight gain, mood swings and Cushingoid appearance from corticosteroids, and these are often omitted from trial reports (28, 29).

Patient-centered outcomes in many glomerular diseases have not been identified and their relative importance is unknown. The aim of this study was to identify and prioritize outcomes important to patients with glomerular disease and their caregivers, and to describe the reasons for their choices. This may guide the selection of outcomes for research in glomerular disease and strengthen the patient-centered evidence base for decision-making.

METHODS

Participant selection and recruitment

We recruited patients aged 18 years or older and their caregivers (family member or support person involved in caring for the patient) from six centers in Australia (Brisbane, Melbourne and Sydney), four centers in Hong Kong, three centers in the United Kingdom (London, Sheffield and York), and one center in the United States (Los Angeles). Patients were English-speaking (English or Spanish speaking in the United States). We used purposive sampling to ensure diversity based on demographic and clinical characteristics (e.g. age, sex, ethnicity, glomerular disease, kidney replacement therapy) because there were likely to be differences in priorities, values and goals based upon these characteristics. This approach can help to elicit breadth and differences of opinion. We recorded participant characteristics to target recruitment for subsequent groups.

Patients with primary and secondary glomerular disease were eligible and nominated by their nephrologist. We excluded patients with conditions that have substantially different core clinical features (e.g. deafness, liver cirrhosis) and treatments (e.g. anti-viral medications, no immunosuppression). These include pure post-infectious nephritis, hepatitis B, C and HIV-associated nephropathy, collagenopathies, amyloidosis, diabetic and hypertensive nephropathies and storage diseases.

Informed consent was obtained from all participants. Participants were reimbursed USD\$50 or equivalent in local currency for travel expenses. Ethics approval was obtained for all participating sites.

Data Collection

We conducted nominal group technique embedded in focus groups; patients and caregivers self-reported all characteristics. The nominal group technique is a consensus method used in healthcare priority research (30-34). It uses a moderated, structured discussion to help participants generate ideas

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(e.g. outcomes) followed by a ranking exercise that allows them to privately assign priorities to outcomes, thereby reducing the influence of dominant individuals or perceived social acceptability (35). The two-hour groups were conducted from March to July 2018, and involved: 1) discussion about their experiences of glomerular disease and interventions; 2) identification of outcomes that were then compiled (supplemented by outcomes from trials and previous groups); 3) individual ranking of the outcomes identified (1 being most important); and 4) discussion of the reasons for their choices. The question guide is provided in Supplemental File 1. One facilitator (A.T., L.R., S.A.C., T.G.) conducted the groups in a place external to clinical settings. All facilitators (A.T., L.R., S.A.C., T.G.) were trained qualitative researchers with experience moderating focus groups. A co-facilitator (C.L., L.D., S.A.C., T.G.) noted participant dynamics and non-verbal communication. All groups were audio recorded and transcribed verbatim. We convened subsequent groups until held no new outcomes or themes emerged (i.e. data saturation).

Data Analysis

Nominal Group Ranking

A relative importance score was calculated for each outcome that incorporated the rank assigned, as well as the frequency with which the outcome was given a rank (see Supplemental File 2). Values approaching 1 indicate a highly prioritized outcome based on higher ranks and more frequent nominations, whereas values approaching 0 indicate infrequently and/or poorly ranked outcomes. Confidence intervals were calculated for each importance score using bootstrapping. We performed pre-specified subgroup analysis by patient/caregiver role, age, sex, country, disease stage and type (36). Data was analyzed using R version 3.5.1 (The R Foundation for Statistical Computing, Vienna, Austria).

Qualitative Analysis

Transcripts were imported into HyperRESEARCH (version 4.0.3, ResearchWare Inc., Randolph, MA) for thematic analysis and coding. A qualified translator who was the moderator for the Spanish-

speaking groups translated them into English. S.A.C. reviewed transcripts line-by-line to identify the underlying reasons and values that led to participants' rankings. These concepts were coded and analyzed inductively for each group and then compared between groups to generate initial subthemes and themes. The preliminary coding framework was discussed and reviewed by the research team (A.T., C.L., L.R., S.A.C., T.G.) to ensure that all the data were reflected in the themes (i.e. investigator triangulation).

RESULTS

Participant characteristics

We recruited 101 (75%) patients and 33 (25%) caregivers (total N=134) to participate in 16 focus groups held across Australia (6 groups), Hong Kong (2 groups), the United Kingdom (4 groups) and the United States (4 groups; Table 1). Reasons for non-participation included prior work commitments, being unwell and lack of interest. The groups were conducted in English (14 groups) and Spanish (2 groups) languages. Participants were aged 19 to 85 years (mean 51) and 68 (51%) were women. Patients were diagnosed at a mean age of 39 years (range 2-85); most had chronic kidney disease (66, 65%) (CKD) however 29 (29%) patients had received dialysis and/or transplant. Fifty (50%) had a kidney-limited glomerular disease and 38 (38%) had a glomerular disease with systemic involvement. Seventy-three (72%) had received immunosuppressive therapy. Comorbid conditions are provided in Supplemental Table 1. Of the 33 caregivers, 21 (64%) were spouses, 4 (12%) were parents, 7 (21%) were other family members and 1 (3%) was a friend.

Nominal group ranking

Overall, participants identified 58 different outcomes (Figure 1). Kidney function was the highest ranked outcome, conceptualized as overall how well their kidneys work or stage of chronic kidney disease as estimated by eGFR. The top ten outcomes for patients were kidney function (importance

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score 0.40), mortality (0.29), need for dialysis or transplant (0.24), life participation (0.18), fatigue (0.17) infection and immunity (0.12), anxiety (0.12), impact on family (0.12), ability to work (0.11) and blood pressure (0.10). The top ten outcomes for caregivers were kidney function (0.47), mortality (0.31), life participation (0.19), need for dialysis or transplant (0.18), fatigue (0.18), cardiovascular disease (0.15), anxiety (0.15), blood pressure (0.13), impact on family (0.13) and relapse (0.10) (Supplemental Table 2).

When analyzed by sex, men and women had the same top five outcomes in similar order; kidney function, mortality, need for dialysis or transplant, life participation and fatigue (Supplemental Table 3). By age, the top four outcomes were the same in participants aged less than 51 years and those 51 years or older (Supplemental Table 4). In a cross-country comparison, mortality and kidney function were consistently in the top three ranked outcomes (Supplemental Table 5).

Patients with CKD shared seven of the top ten outcomes with patients who had experienced dialysis and/or transplant (Supplemental Table 6). Patients with kidney-limited glomerular disease also shared seven of the top ten outcomes with those who had a glomerular involvement as part of a systemic disease (Supplemental Table 7). Kidney function and mortality were consistently present in the top three for CKD stage and disease sub-groups; life participation and fatigue were within the top five. Patients with largely proteinuric, kidney-limited conditions had similar top priorities to other subgroups, however remission, relapse and fluid retention were ranked in the top ten (Supplemental Table 8). Proteinuria was not highly prioritized by any subgroup.

Qualitative findings

Three themes explained the reasons for the identification and prioritization of outcomes: constraining day-to-day existence (5 subthemes), impaired agency and control over health (4 subthemes), and threats to future health and family (4 subthemes). The subthemes are outlined below and selected

quotations are presented in Table 2. The thematic schema (Figure 2) demonstrates the links among the themes and prioritization of outcomes.

Constraining day-to-day existence

Permeating and confining daily living. Symptoms described as “relentless” and all “consuming” (e.g. anxiety) were highly prioritized because they restricted daily activities. Some outcomes were “exhausting” (e.g. fatigue, cognitive function) and impaired their ability to perform basic daily tasks because “it’s a struggle.” Patients were frustrated by their “very restrictive lifestyle.”

Altered appearance eroding self-confidence. For some patients, “horrible” and “embarrassing” changes to their appearance were of high priority because they lost “confidence...self-esteem.” This caused “anxiety and stress,” which impaired social functioning and work. Some lost a sense of self – “people couldn’t recognize me...couldn’t believe I was the same person;” “I was bloated and looked like a monster.”

Trauma of past events. “Terrifying” outcomes were ranked highly because they were “scary and sudden” or “very hurtful” (e.g. infection, loss of kidney or cognitive function). Recurrent, “damaging” outcomes (e.g. dialysis, relapse) were also prioritized highly because participants wanted to avoid going “through the hell again.” Outcomes that occurred around the time of traumatic events, for example at diagnosis or near-death experiences, were seen as important (e.g. infection, swelling, hospitalization).

Loss of valued social and work opportunities. Symptoms that threatened patients’ ability to work and their financial means (e.g. fatigue, cognitive function) were “stressful” and highly prioritized. Participants valued life participation and ability to work as they feared being limited in these areas, and this was compounded by a lack of understanding and empathy from friends, colleagues and employers due to their “silent” glomerular disease.

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Undermining family roles and relationships. Outcomes that caused patients to feel they were a “burden” on others (e.g. need for dialysis or transplant, fatigue, mobility) were prioritized highly because of the “toll” caused by anxiety, guilt and depression. Mortality, need for dialysis or transplant and ability to work were “feared” and highly ranked if they jeopardized patients’ abilities to provide and care for their family. Outcomes were important if they threatened their relationship with their partner, fertility or ability to fulfill parental responsibilities (e.g. mood swings, restless legs, anxiety).

Impaired agency and control over health

Demoralizing loss of freedom. Patients felt “depressed” and anxious by “untreatable” outcomes they “can’t control” and ranked them highly. Patients felt “constrained or imprisoned” by time-consuming and inflexible outcomes for which there were no other options (e.g. need for dialysis or transplant, hospitalization). Some participants gave lower priority to “inevitable” outcomes, such as dialysis or death, because they could not alter them.

Fear of unexpected bodily harms. Patients were scared of “silent surprises” from outcomes that came “out of nowhere” because they “felt fine” (e.g. kidney function, proteinuria). This was “confronting” and caused anxiety. Patients were “never quite sure” what was happening which compounded their sense of not “knowing” about their disease.

Gaps in care. Missed opportunities to prevent disease and inadequate or dismissive counseling by healthcare providers drove some patients to give high priority to outcomes such as kidney function, proteinuria, and bone health. Life participation, depression, anxiety and ability to work were highly prioritized by patients who felt their concerns in these areas were not addressed, and similarly prioritized outcomes that “nourished” them (e.g. sleep, strength and physical functioning). Patients were fearful and felt a sense of betrayal around adverse treatment outcomes of which they previously unaware (e.g. fertility, diabetes), and ranked these higher.

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5 *Managing triggers and driving factors.* Patients valued outcomes that were seen as a “root cause” or
6 “key driver” of other important and “interrelated” outcomes (e.g. kidney function, proteinuria, relapse,
7 infection), especially if modifying them might prevent a “cascade of events.” Control over an
8 outcome “increased certainty” and reduced anxiety; a lack of control meant that anxiety was more
9 highly prioritized because it exacerbated and complicated the management of other outcomes (e.g.
10 relapse, depression). Biochemical and clinical outcomes were valued if they increased the patient’s
11 ability to monitor and manage their disease (e.g. proteinuria, kidney function, blood pressure).
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22 Threats to future self and family

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26 *Adaptability to diverging expectations.* Patients wanted to “return to their lives” and ranked outcomes
27 higher the more their disease or treatment changed those outcomes (e.g. life participation, ability to
28 work). Patients highly prioritized outcomes that threatened their identity (e.g. cognitive function,
29 anxiety) because they felt they were not “the same person” and did not want their disease to “define”
30 them. Acceptance of some outcomes (e.g. need for dialysis or transplant, mortality) led to a lower
31 priority as they were “built into” their lives and made a part of their “story.”
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41 *Endangering life goals.* Outcomes were highly ranked if they compromised “envisaged” goals or key
42 roles during future stages of life (e.g. fertility, life participation, ability to work). Patients highly
43 prioritized more immediate “obstacles” to life goals (e.g. need for dialysis or transplant) or if they
44 irreversibly “wiped out” future potential (e.g. fertility). Mortality, in particular, was highly ranked for
45 all of these reasons.
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54 *Inevitable, irreversible consequences.* Patients highly prioritized kidney function and outcomes that
55 “kept the damage at bay” (e.g. remission) because “scarring” meant their kidneys could not
56 “regenerate.” They were terrified of being “locked-in to a certain path” and just waiting for
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“inevitable” and “grim” consequences (e.g. need for dialysis or transplant). Need for dialysis and transplant was seen as the “ultimate issue” that “everything else fits around” and a precursor to death.

Uncertainty from unpredictable hazards. Patients ranked outcomes higher if they increased uncertainty where “anything could happen,” or anxiety around “what the future holds” (e.g. relapse, cancer and need for dialysis or transplant). Other patients gave those outcomes negatively impacted by uncertainty or anxiety a higher priority (e.g. ability to work, finances and life participation). Patients valued outcomes that increased “stability” and “predictability” in their lives (e.g. remission).

DISCUSSION

Overall, patients with glomerular disease and their caregivers highly prioritized kidney function, an outcome reflecting disease progression and loss of kidney function, followed by mortality and need for dialysis or transplant. The patient-reported outcomes of life participation, fatigue, anxiety and impact on family were also consistently and highly ranked. These outcomes were given higher priority because they led to extensive and distressing impacts on patients’ current or future lifestyles, were unpredictable and difficult to control, and caused or exacerbated other important outcomes, such as depression, ability to work and financial impact.

Kidney function was of the utmost importance to patients with glomerular disease and their caregivers. For patients, being able to know and monitor changes in their kidney function meant they could better understand their condition, and this strengthened their sense of having agency in their healthcare. They feared the potential for asymptomatic yet irreversible deterioration in kidney function. Our results suggest that patients perceive kidney function to be a more important outcome than need for dialysis or transplant because this reflects their goal of preserving kidney function and an overall healthy life, while avoiding the need for dialysis or transplant. Need for dialysis or transplant remains an important but perhaps less highly prioritized outcome for patients who have already commenced kidney replacement therapy.

Across all subgroups, kidney function and mortality were ranked within the top three and need for dialysis or transplant was in the top seven. The top ranked outcomes were generally concordant by country, age, sex and patient/caregiver role. Mortality was ranked first in the United Kingdom and United States; kidney function was the top outcome in Australia and Hong Kong. These differences potentially relate to patient perception of value within their healthcare system, practice patterns or systems of care. For disease subgroups (stage and type), the top outcomes were generally consistent but there were some expected differences in rankings. Fluid retention and relapse/remission were generally not highly ranked, except by those patients with a typically proteinuric, kidney-limited disease. Proteinuria was not highly prioritized by any subgroup, including by patients with predominantly proteinuric conditions. These disparities in outcomes between subgroups were anticipated and reflect the divergent 'second tier' priorities for patients with different types of glomerular disorders.

Notably, the patient-reported outcomes of life participation, fatigue, anxiety and impact on family were highly prioritized by patients and caregivers. Patients with active glomerular disease have a poor health-related quality of life and often have anxiety and depression (24, 37-40). Fatigue is a frequent, under-recognized and highly disabling symptom in patients with vasculitis (10, 41), but is also of concern in those with kidney-limited glomerular disease, nephrotic conditions, and worst in those who are on dialysis (37, 40, 42). Swelling has previously been shown to have a strong negative association with health-related quality of life in predominantly proteinuric glomerular diseases (37).

Systematic reviews in membranous nephropathy, IgA nephropathy and renal vasculitis show that the top three outcomes prioritized by patients and caregivers (kidney function, mortality and need for dialysis or transplant) are among those most frequently reported (16-18). However, the disparity between the length of a clinical trial and the time to kidney failure or mortality in many glomerular diseases contributes to under-reporting of these critically important outcomes. Recent data suggests short-term decline in glomerular filtration rate (GFR) could be used as a surrogate end point for

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disease progression in trials (43). Our results provide support for the use of GFR slope as a surrogate trial endpoint from a patient and caregiver perspective.

Despite their importance to patients, patient-reported outcomes have not been routinely reported in trials in glomerular disease to date (44, 45). Trials in oncology show that reporting health-related quality of life provides better information on the trade-off between patient experience and survival, thereby improving communication and decision-making as well as quality of life (46, 47). Recent trials in glomerular disease have assessed quality of life using generic instruments, although this can lead to disease-specific outcomes (e.g. swelling) being incompletely captured (48, 49). The prospective CureGN cohort plans to collect patient-reported data on both generic and disease-specific outcomes (50). Glomerular disease-specific measures for patients with systemic ANCA-associated vasculitis (AAV-PRO) and the FSGS symptom diary/impact questionnaire are starting to be validated (11, 51). However, the importance of these outcomes to patients and caregivers highlights the need to develop instruments that can be used in specific diseases but also across a range of glomerular diseases.

Our study involved patients and caregivers from four countries who spoke two languages and had diverse demographic and clinical characteristics. Quantitative and qualitative methods were used to elicit patient priorities for outcomes and understand the reasons for their prioritization. However, there were some limitations. It is possible that the priorities and experiences of patients with specific (especially rarer) types of glomerular disease may have been missed. Moreover, the small sample for some subgroups limited the ability to make valid comparisons. Patients who were reluctant or unable to participate in a group setting may not have attended the focus groups. Finally, we did not include patients from low and middle-income countries and thus the transferability of the findings beyond our setting remains uncertain.

Trials in glomerular diseases have specific challenges that necessitate a consensus-based, collaborative approach (44, 52). This study, as part of the Standardized Outcomes in Nephrology –

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3 Glomerular Disease (SONG-GD) initiative, will inform the development of a core outcome set for
4 trials in glomerular disease based on the shared priorities of patients, caregivers and health
5 professionals (36). Validated measures for each outcome will then be identified using a similar
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7 consensus-driven methodology. While the top ranked outcomes were concordant across the different
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9 subgroups of glomerular disease, future work is required to establish consensus on important disease-
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11 specific outcomes and their measures.
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18 Patients and caregivers gave highest priority to the outcomes of kidney function, mortality and need
19 for dialysis or transplant. Importantly, they also highly prioritized patient-reported outcomes such as
20 life participation and fatigue that are less well reported. Involving patients and caregivers in
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22 establishing outcomes to be reported in research can strengthen a patient-centered evidence base that
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24 supports shared decision-making and better outcomes for patients with glomerular disease.
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SUPPLEMENTAL MATERIAL

Supplemental File 1. Run sheet

Supplemental File 2. Relative importance score

Supplemental Table 1. Comorbid patient conditions

Supplemental Table 2. Top ten outcomes of patients and caregivers

Supplemental Table 3. Top ten outcomes by sex

Supplemental Table 4. Top ten outcomes by age

Supplemental Table 5. Top ten outcomes by country

Supplemental Table 6. Top ten outcomes by stage of kidney disease

Supplemental Table 7. Top ten outcomes by glomerular disease sub-group

Supplemental Table 8. Top ten outcomes for predominantly proteinuric kidney-limited disease.

REFERENCES

1. Moriyama T, Tanaka K, Iwasaki C, Oshima Y, Ochi A, Kataoka H, Itabashi M, Takei T, Uchida K, Nitta K: Prognosis in IgA nephropathy: 30-year analysis of 1,012 patients at a single center in Japan. *PLoS ONE*, 9: e91756, 2014

2. Wetmore JB, Guo H, Liu J, Collins AJ, Gilbertson DT: The incidence, prevalence, and outcomes of glomerulonephritis derived from a large retrospective analysis. *Kidney Int*, 90: 853-860, 2016

3. Jefferson JA: Complications of Immunosuppression in Glomerular Disease. *Clin J Am Soc Nephrol*, 13: 1264-1275, 2018

4. Faurschou M, Mellemkjaer L, Voss A, Keller KK, Hansen IT, Baslund B: Prolonged risk of specific malignancies following cyclophosphamide therapy among patients with granulomatosis with polyangiitis. *Rheumatol*, 54: 1345-1350, 2015

5. Heaf JG, Hansen A, Laier GH: Quantification of cancer risk in glomerulonephritis. *BMC Nephrol*, 19: 27, 2018

6. Heijl C, Harper L, Flossmann O, Stucker I, Scott DG, Watts RA, Hoglund P, Westman K, Mahr A, European Vasculitis Study G: Incidence of malignancy in patients treated for antineutrophil cytoplasm antibody-associated vasculitis: follow-up data from European Vasculitis Study Group clinical trials. *Ann Rheum Dis*, 70: 1415-1421, 2011

7. Blom K, Odutayo A, Bramham K, Hladunewich MA: Pregnancy and Glomerular Disease: A Systematic Review of the Literature with Management Guidelines. *Clin J Am Soc Nephrol*, 12: 1862-1872, 2017

8. Huong DL, Amoura Z, Duhaut P, Sbail A, Costedoat N, Wechsler B, Piette JC: Risk of ovarian failure and fertility after intravenous cyclophosphamide. A study in 84 patients. *J Rheumatol*, 29: 2571-2576, 2002

9. Grootscholten C, Snoek FJ, Bijl M, van Houwelingen HC, Derksen RH, Berden JH, Dutch Working Party of SLE: Health-related quality of life and treatment burden in patients with proliferative lupus nephritis treated with cyclophosphamide or azathioprine/ methylprednisolone in a randomized controlled trial. *J Rheumatol*, 34: 1699-1707, 2007

10. Herlyn K, Hellmich B, Seo P, Merkel PA: Patient-reported outcome assessment in vasculitis may provide important data and a unique perspective. *Arthritis Care Res*, 62: 1639-1645, 2010
11. Mathias SD, Vallow S, Gipson DS, Thorneloe KS, Sprecher D: Development of Focal Segmental Glomerulosclerosis Patient-Reported Outcome Measures: Symptom Diary and Symptom Impact Questionnaire. *Am J Kidney Dis*, 70: 532-540, 2017
12. Cattran DC: Toward quantitating the burden of glomerulonephritis in the United States. *Kidney Int*, 90: 732-734, 2016
13. Knoop T, Vikse BE, Svarstad E, Leh S, Reisaeter AV, Bjornekleit R: Mortality in patients with IgA nephropathy. *Am J Kidney Dis*, 62: 883-890, 2013
14. Lee H, Kim DK, Oh KH, Joo KW, Kim YS, Chae DW, Kim S, Chin HJ: Mortality and renal outcome of primary glomerulonephritis in Korea: observation in 1,943 biopsied cases. *Am J Nephrol*, 37: 74-83, 2013
15. Yap DY, Tang CS, Ma MK, Lam MF, Chan TM: Survival analysis and causes of mortality in patients with lupus nephritis. *Nephrol Dial Transplant*, 27: 3248-3254, 2012
16. Chen Y, Schieppati A, Chen X, Cai G, Zamora J, Giuliano GA, Braun N, Perna A: Immunosuppressive treatment for idiopathic membranous nephropathy in adults with nephrotic syndrome. *Cochrane Database Syst Rev*: CD004293, 2014
17. Vecchio M, Bonerba B, Palmer SC, Craig JC, Ruospo M, Samuels JA, Molony DA, Schena FP, Strippoli GF: Immunosuppressive agents for treating IgA nephropathy. *Cochrane Database Syst Rev*: CD003965, 2015
18. Walters G, Willis NS, Craig JC: Interventions for renal vasculitis in adults. *Cochrane Database Syst Rev*: CD003232, 2015
19. Price A, Albarqouni L, Kirkpatrick J, Clarke M, Liew SM, Roberts N, Burls A: Patient and public involvement in the design of clinical trials: An overview of systematic reviews. *J Eval Clin Pract*, 24: 240-253, 2018
20. Sautenet B, Tong A, Chapman JR, Warrens AN, Rosenbloom D, Wong G, Gill J, Budde K, Rostaing L, Marson L, Josephson MA, Reese PP, Pruett TL, Evangelidis N, Craig JC: Range

- and Consistency of Outcomes Reported in Randomized Trials Conducted in Kidney Transplant Recipients: A Systematic Review. *Transplantation*, 102: 2065-2071, 2018
21. Sautenet B, Tong A, Williams G, Hemmelgarn BR, Manns B, Wheeler DC, Tugwell P, van Biesen W, Winkelmayer WC, Crowe S, Harris T, Evangelidis N, Hawley CM, Pollock C, Johnson DW, Polkinghorne KR, Howard K, Gallagher MP, Kerr PG, McDonald SP, Ju A, Craig JC: Scope and Consistency of Outcomes Reported in Randomized Trials Conducted in Adults Receiving Hemodialysis: A Systematic Review. *Am J Kidney Dis*, 72: 62-74, 2018
22. Howell M, Wong G, Turner RM, Tan HT, Tong A, Craig JC, Howard K: The Consistency and Reporting of Quality-of-Life Outcomes in Trials of Immunosuppressive Agents in Kidney Transplantation: A Systematic Review and Meta-analysis. *Am J Kidney Dis*, 67: 762-774, 2016
23. Patrick DL, Burke LB, Powers JH, Scott JA, Rock EP, Dawisha S, O'Neill R, Kennedy DL: Patient-reported outcomes to support medical product labeling claims: FDA perspective. *Value Health*, 10 Suppl 2: S125-137, 2007
24. Daleboudt GM, Berger SP, Broadbent E, Kaptein AA: Health-related quality of life in patients with systemic lupus erythematosus and proliferative lupus nephritis. *Psychol Health Med*, 16: 393-404, 2011
25. Li L, Neogi T, Jick S: A cohort study of comorbidity in patients with granulomatosis with polyangiitis. *Rheumatology (Oxford)*, 57: 291-299, 2018
26. Tong A, Gill J, Budde K, Marson L, Reese PP, Rosenbloom D, Rostaing L, Wong G, Josephson MA, Pruett TL, Warrens AN, Craig JC, Sautenet B, Evangelidis N, Ralph AF, Hanson CS, Shen JJ, Howard K, Meyer K, Perrone RD, Weiner DE, Fung S, Ma MKM, Rose C, Ryan J, Chen LX, Howell M, Larkins N, Kim S, Thangaraju S, Ju A, Chapman JR, Investigators SO-T: Toward Establishing Core Outcome Domains For Trials in Kidney Transplantation: Report of the Standardized Outcomes in Nephrology-Kidney Transplantation Consensus Workshops. *Transplantation*, 101: 1887-1896, 2017
27. Davies SJ: Reaching consensus on the important outcomes for peritoneal dialysis patients. *Kidney Int*, 96: 545-546, 2019

28. Tse KC TC, Lio WI, Lam MF and Chan TM: Quality of life comparison between corticosteroidand-mycophenolate mofetil and corticosteroidand-oral cyclophosphamide in the treatment of severe lupus nephritis. *Lupus*: 371-379, 2006
29. Mathias SD, Berry P, De Vries J, Askanase A, Pascoe K, Colwell HH, Chang DJ: Development of the Systemic Lupus Erythematosus Steroid Questionnaire (SSQ): a novel patient-reported outcome tool to assess the impact of oral steroid treatment. *Health Qual Life Outcomes*, 15: 43, 2017
30. Andrew H Van de Ven ALD: The nominal group as a research instrument for exploratory health studies. *American Journal of Public Health*, 62: 337-342, 1972
31. Corner J, Wright D, Hopkinson J, Gunaratnam Y, McDonald JW, Foster C: The research priorities of patients attending UK cancer treatment centres: findings from a modified nominal group study. *Br J Cancer*, 96: 875-881, 2007
32. Manera KE, Johnson DW, Craig JC, Shen JJ, Ruiz L, Wang AY, Yip T, Fung SKS, Tong M, Lee A, Cho Y, Viecelli AK, Sautenet B, Teixeira-Pinto A, Brown EA, Brunier G, Dong J, Dunning T, Mehrotra R, Naicker S, Pecoits-Filho R, Perl J, Wilkie M, Tong A: Patient and Caregiver Priorities for Outcomes in Peritoneal Dialysis: Multinational Nominal Group Technique Study. *Clin J Am Soc Nephrol*, 14: 74-83, 2019
33. Sanderson T, Hewlett S, Richards P, Morris M, Calnan M: Utilizing qualitative data from nominal groups: exploring the influences on treatment outcome prioritization with rheumatoid arthritis patients. *J Health Psychol*, 17: 132-142, 2012
34. Wortley S, Tong A, Howard K: Preferences for engagement in health technology assessment decision-making: a nominal group technique with members of the public. *BMJ Open*, 6, 2016
35. Black N: *Consensus development methods. Qualitative Research in Health Care, Third Edition*, Malden: Blackwell, 2006
36. Carter SA, Lightstone L, Cattran D, Bagga A, Barbour SJ, Barratt J, Boletis J, Caster D, Coppo R, Fervenza FC, Floege J, Hladunewich M, Hogan JJ, Kitching AR, Lafayette R, Malvar A, Radhakrishnan J, Rovin BH, Zhang H, Gutman T, Howell M, Logeman C, Shen JJ, Teixeira-Pinto A, Alexander SI, Cho Y, Craig JC, Harris D, Johnson DW, Kerr PG, Ryan J, Viecelli

- AK, Wang AY, Wilkie M, Scholes-Robertson N, Tong A, Initiative S-G: Standardized Outcomes in Nephrology-Glomerular Disease (SONG-GD): establishing a core outcome set for trials in patients with glomerular disease. *Kidney Int*, 95: 1280-1283, 2019
37. Canetta PA, Troost JP, Mahoney S, Kogon AJ, Carlozzi N, Bartosh SM, Cai Y, Davis TK, Fernandez H, Fornoni A, Gbadegesin RA, Herreshoff E, Mahan JD, Nachman PH, Selewski DT, Sethna CB, Srivastava T, Tuttle KR, Wang CS, Falk RJ, Gharavi AG, Gillespie BW, Greenbaum LA, Holzman LB, Kretzler M, Robinson BM, Smoyer WE, Guay-Woodford LM, Reeve B, Gipson DS, Cure GNC: Health-related quality of life in glomerular disease. *Kidney Int*, 95: 1209-1224, 2019
38. Gipson DS, Trachtman H, Kaskel FJ, Radeva MK, Gassman J, Greene TH, Moxey-Mims MM, Hogg RJ, Watkins SL, Fine RN, Middleton JP, Vehaskari VM, Hogan SL, Vento S, Flynn PA, Powell LM, McMahan JL, Siegel N, Friedman AL: Clinical trials treating focal segmental glomerulosclerosis should measure patient quality of life. *Kidney Int*, 79: 678-685, 2011
39. Jolly M, Toloza S, Goker B, Clarke AE, Navarra SV, Wallace D, Weisman M, Mok CC: Disease-specific quality of life in patients with lupus nephritis. *Lupus*, 27: 257-264, 2018
40. Liborio AB, Santos JP, Minete NF, Diogenes Cde A, Soares AP, Queiroz AL, Barreto DM: Proteinuria is associated with quality of life and depression in adults with primary glomerulopathy and preserved renal function. *PLoS ONE*, 7: e37763, 2012
41. Mozaffarian N, Lobosco S, Lu P, Roughley A, Alperovich G: Satisfaction with control of systemic lupus erythematosus and lupus nephritis: physician and patient perspectives. *Patient Prefer Adherence*, 10: 2051-2061, 2016
42. Urquhart-Secord R, Craig JC, Hemmelgarn B, Tam-Tham H, Manns B, Howell M, Polkinghorne KR, Kerr PG, Harris DC, Thompson S, Schick-Makaroff K, Wheeler DC, van Biesen W, Winkelmayer WC, Johnson DW, Howard K, Evangelidis N, Tong A: Patient and Caregiver Priorities for Outcomes in Hemodialysis: An International Nominal Group Technique Study. *Am J Kidney Dis*, 68: 444-454, 2016

43. Inker LA, Heerspink HJL, Tighiouart H, Levey AS, Coresh J, Gansevoort RT, Simon AL, Ying J, Beck GJ, Wanner C, Floege J, Li PK, Perkovic V, Vonesh EF, Greene T: GFR Slope as a Surrogate End Point for Kidney Disease Progression in Clinical Trials: A Meta-Analysis of Treatment Effects of Randomized Controlled Trials. *J Am Soc Nephrol*, 2019
44. Baigent C, Herrington WG, Coresh J, Landray MJ, Levin A, Perkovic V, Pfeffer MA, Rossing P, Walsh M, Wanner C, Wheeler DC, Winkelmayer WC, McMurray JJV, Participants KCCoCitCoCTiNC: Challenges in conducting clinical trials in nephrology: conclusions from a Kidney Disease-Improving Global Outcomes (KDIGO) Controversies Conference. *Kidney Int*, 92: 297-305, 2017
45. Craig JC, Tong A, Strippoli GF: New approaches to trials in glomerulonephritis. *Nephrol Dial Transplant*, 32: i1-i6, 2017
46. Dutton SJ, Ferry DR, Blazeby JM, Abbas H, Dahle-Smith A, Mansoor W, Thompson J, Harrison M, Chatterjee A, Falk S, Garcia-Alonso A, Fyfe DW, Hubner RA, Gamble T, Peachey L, Davoudianfar M, Pearson SR, Julier P, Jankowski J, Kerr R, Petty RD: Gefitinib for oesophageal cancer progressing after chemotherapy (COG): a phase 3, multicentre, double-blind, placebo-controlled randomised trial. *Lancet Oncol*, 15: 894-904, 2014
47. Ford HE, Marshall A, Bridgewater JA, Janowitz T, Coxon FY, Wadsley J, Mansoor W, Fyfe D, Madhusudan S, Middleton GW, Swinson D, Falk S, Chau I, Cunningham D, Kareclas P, Cook N, Blazeby JM, Dunn JA, Investigators C-: Docetaxel versus active symptom control for refractory oesophagogastric adenocarcinoma (COUGAR-02): an open-label, phase 3 randomised controlled trial. *Lancet Oncol*, 15: 78-86, 2014
48. Fervenza FC, Appel GB, Barbour SJ, Rovin BH, Lafayette RA, Aslam N, Jefferson JA, Gipson PE, Rizk DV, Sedor JR, Simon JF, McCarthy ET, Brenchley P, Sethi S, Avila-Casado C, Beanlands H, Lieske JC, Philibert D, Li T, Thomas LF, Green DF, Juncos LA, Beara-Lasic L, Blumenthal SS, Sussman AN, Erickson SB, Hladunewich M, Canetta PA, Hebert LA, Leung N, Radhakrishnan J, Reich HN, Parikh SV, Gipson DS, Lee DK, da Costa BR, Juni P, Cattran DC, Investigators M: Rituximab or Cyclosporine in the Treatment of Membranous Nephropathy. *N Engl J Med*, 381: 36-46, 2019

49. Li X, Liu Z, Wang L, Wang R, Ding G, Shi W, Fu P, He Y, Cheng G, Wu S, Chen B, Du J, Ye Z, Tao Y, Huo B, Li H, Chen J: Tacrolimus Monotherapy after Intravenous Methylprednisolone in Adults with Minimal Change Nephrotic Syndrome. *Journal of the American Society of Nephrology*, 28: 1286-1295, 2017

50. Mariani LH, Bomback AS, Canetta PA, Flessner MF, Helmuth M, Hladunewich MA, Hogan JJ, Kiryluk K, Nachman PH, Nast CC, Rheault MN, Rizk DV, Trachtman H, Wenderfer SE, Bowers C, Hill-Callahan P, Marasa M, Poulton CJ, Revell A, Vento S, Barisoni L, Cattran D, D'Agati V, Jennette JC, Klein JB, Laurin LP, Twombly K, Falk RJ, Gharavi AG, Gillespie BW, Gipson DS, Greenbaum LA, Holzman LB, Kretzler M, Robinson B, Smoyer WE, Guay-Woodford LM, Cure GNC: CureGN Study Rationale, Design, and Methods: Establishing a Large Prospective Observational Study of Glomerular Disease. *Am J Kidney Dis*, 73: 218-229, 2019

51. Robson JC, Dawson J, Doll H, Cronholm PF, Milman N, Kellom K, Ashdown S, Easley E, Gebhart D, Lanier G, Mills J, Peck J, Luqmani RA, Shea J, Tomasson G, Merkel PA: Validation of the ANCA-associated vasculitis patient-reported outcomes (AAV-PRO) questionnaire. *Ann Rheum Dis*, 77: 1157-1164, 2018

52. Leaf DE, Appel GB, Radhakrishnan J: Glomerular disease: why is there a dearth of high quality clinical trials? *Kidney Int*, 78: 337-342, 2010

Table 1. Characteristics of adult patients with glomerular disease and their caregivers who prioritized outcomes using focus groups with nominal group technique.

	Australia n=50	Hong Kong n=22	United Kingdom n=29	United States n=33	All N=134
Patient	38 (76)	16 (73)	24 (83)	23 (70)	101 (75)
Caregiver or family	12 (24)	6 (27)	5 (17)	10 (30)	33 (25)
Sex					
Male	29 (58)	13 (59)	14 (48)	10 (30)	66 (49)
Female	21 (42)	9 (41)	15 (52)	23 (70)	68 (51)
Age group (years)					
18-39	14 (28)	3 (14)	4 (14)	11 (33)	32 (24)
40-59	20 (40)	15 (68)	8 (28)	14 (42)	57 (43)
60-79	16 (32)	4 (18)	16 (55)	6 (18)	42 (32)
>80	-	-	1 (3)	1 (3)	2 (2)
Ethnicity					
Caucasian/European	34 (68)	-	24 (83)	3 (9)	61 (46)
Asian (Central, South, East)	13 (26)	22 (100)	1 (3)	2 (6)	38 (28)
Hispanic	-	-	1 (3)	22 (67)	23 (17)
African/African-American	-	-	2 (7)	4 (12)	6 (4)
Other	3 (6)	-	1 (3)	2 (6)	6 (4)
Educational attainment ^a					
Primary school	4 (11)	4 (25)	5 (21)	8 (35)	21 (21)
Secondary school (Grade 10)	5 (13)	3 (19)	1 (4)	1 (4)	10 (10)
Secondary school (Grade 12)	6 (16)	3 (19)	2 (8)	5 (22)	16 (16)
Certificate/diploma	9 (24)	-	7 (29)	6 (26)	22 (22)
University degree	14 (37)	6 (38)	7 (29)	3 (13)	30 (30)
Employment ^a					
Full time or part time	22 (58)	8 (50)	6 (25)	4 (17)	40 (40)
Student	1 (3)	-	-	3 (13)	4 (4)
Not employed	4 (11)	4 (25)	3 (13)	10 (43)	21 (21)
Other/retired	11 (29)	4 (25)	14 (58)	5 (22)	34 (34)
Type of glomerular disease ^a					
Lupus nephritis	6 (16)	2 (13)	6 (25)	4 (17)	18 (18)
Vasculitis	6 (16)	-	7 (29)	5 (22)	18 (18)
IgA nephropathy	10 (26)	5 (31)	2 (8)	1 (4)	18 (18)
FSGS	6 (16)	-	-	4 (17)	10 (10)
Membranous nephropathy	3 (8)	1 (6)	1 (4)	1 (4)	6 (6)
Minimal change nephropathy	2 (5)	-	1 (4)	2 (9)	5 (5)
MPGN	1 (3)	-	-	5 (22)	6 (6)
C3 glomerulopathy	2 (5)	-	3 (13)	-	5 (5)
Anti-GBM disease	1 (3)	-	-	-	1 (1)
IgG4-related disease	1 (3)	-	-	-	1 (1)
Years since diagnosis ^a					

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2						
3		≤2	11 (29)	1 (6)	8 (33)	10 (43)
4		3-11	14 (37)	3 (19)	7 (29)	7 (30)
5		≥12	13 (34)	11 (69)	6 (25)	4 (17)
6						34 (34)
7	Immunosuppression exposure ^a					
8	Any		30 (79)	9 (56)	17 (71)	17 (74)
9	Corticosteroids		26 (68)	7 (44)	14 (58)	13 (57)
10	Antiproliferative/calcineurin		20 (53)	3 (19)	12 (50)	6 (26)
11	inhibitor					41 (41)
12	Cyclophosphamide		9 (24)	-	6 (25)	12 (52)
13	Plasma exchange		7 (18)	-	5 (21)	5 (22)
14	Biologic agent		2 (5)	-	3 (13)	2 (9)
15						7 (7)
16	Stage of kidney disease ^a					
17	Chronic kidney disease		31 (82)	4 (25)	13 (54)	18 (78)
18	Hemodialysis		3 (8)	3 (19)	3 (13)	5 (22)
19	Peritoneal dialysis		2 (5)	8 (50)	-	3 (13)
20	Living donor transplant		1 (3)	1 (6)	1 (4)	1 (4)
21	Deceased donor transplant		1 (3)	5 (31)	4 (17)	1 (4)
22						11 (11)

^a Patients only. May not sum to totals as some categories represent overlapping experience. Thirteen patients did not know their type of glomerular disease. One patient missing for age; two patients had missing data for education, immunosuppression; six missing years since diagnosis; six missing for

Table 2. Selected illustrative quotations for the themes and subthemes.

<u>Constraining day-to-day existence</u>	
Subthemes	
<i>Permeating and confining daily living</i>	This sickness is just killing me, I couldn't focus on doing – I'm running a business myself, I just can't get focused on anything. This memory thing is bothering me as well, because I think I can't focus on anything, I'm not able to remember anything. – <i>Male patient, HK</i> I'm very anxious all the time. It's actually created almost a mental problem within me, of anxiety. I think that's probably my worst side effect of having kidney disease. – <i>Female patient, AUS</i> I put life participation because I know that looking from the outside, I know [his kidney disease] stops [him] from thinking bigger... Although that's really big, there's this life that has to happen at the same time. – <i>Female caregiver, AUS</i>
<i>Altered appearance eroding self-confidence</i>	People couldn't recognize me. I walked past old colleagues and had to introduce myself again because they couldn't believe I was the same person. – <i>Female patient, AUS</i> It has a knock-on effect on your confidence because you lose hair. You lose confidence, and that's very important. Self-esteem. – <i>Female patient, USA</i> When you go out you look quite horrible, you feel quite horrible. Particularly when your steroid dose goes up really high and you get that real moon face. It's just awful. How do you live with that? – <i>Female patient, AUS</i>
<i>Trauma of past events</i>	If you've not experienced [dialysis] you can't possibly comprehend how difficult it is. – <i>Female patient, UK</i> The reason why we all have slightly different views as to what is one, two, three is because those are the things which impacted us the most when we got diagnosed with that condition – <i>Male caregiver, AUS</i> Yeah, keeping it away, because I don't want to go through the hell again... that was probably one of the worst nights of my life. – <i>Male patient, AUS</i>
<i>Loss of valued social and work opportunities</i>	I was going to do my job. But I couldn't do it, just too exhausted. I knew that I couldn't fulfill the role that I was doing, so very hard for me to say that I couldn't go back to work, very hard. I found that really quite emotional time then. – <i>Female patient, UK</i> I think it's like people look at you and think oh, there's nothing wrong with you. You're not sick... You're tired again, what's wrong with you? Oh, you're sick again, what's wrong with you? They just don't get it. – <i>Female patient, AUS</i> I lost my job. It was huge for me. I was doing a lot of hours there as well, and I was constantly tired, but I loved it. I wasn't as tired as I am now, but yeah, that really, really hurt, that they did that to me. – <i>Female patient, AUS</i>
<i>Undermining family roles and relationships</i>	I picked death, because now I'm fine, but there was a moment, when I saw how my children and grandchildren were affected by my condition, that I thought it would be better if I died. They would have to accept it if I died. – <i>Female patient, USA</i> My husband actually has a man cave now and he doesn't even live in my house. He said 'I can't live with you'. – <i>Female patient AUS</i> When I get sick I can't help anybody. I can't even help myself. And when she sees me being sick, that makes her more anxious, and that puts pressure on her. Then my father-in-law not being well, he then gets anxious. It's just a cycle that keeps going round and round, so it does make it hard. – <i>Female patient, AUS</i>
<u>Impaired agency and control over health</u>	

Subthemes	
Demoralizing loss of freedom	I can't do anything except take medicine. I can only follow the instructions, taking low salts, low protein diets. There's nothing more I can do. In other words, I can't control. It seems I can't control the whole thing. –Male patient, HK When you've been in there a few times, you kind of feel constrained or imprisoned. You just want to be able to walk out and do something else. – Male patient, AUS I say 'what choice?' They say, you have it or else you die... I think well, I better have it then. –Female patient, UK
Fear of unexpected bodily harms	Straight into hospital...dialysis for another four months after I came out. But then, it just stopped. Stopped the dialysis for two and a half years. But it was a big surprise, because I didn't feel sick. I felt fine. I was working like a madman, next day you're in hospital and they're saying that you're really, really sick. I don't feel sick. –Male patient, AUS They said 13% for him...to me that's like my battery is low on my phone. You think he shouldn't be able to, I would think he'd be in bed at that point, but then you're working. They put these numbers out there... -Female carer, USA I didn't think it was that serious. Got my blood test done, went to the doctor, the doctor said that this is stage four kidney disease. There were no symptoms. I'm still fine, I'm not on dialysis yet, but I'm currently running at 10%. It was a big shock. –Female patient, AUS
Gaps in care	Prednisolone is the killer, because that's how I broke my back. I wasn't told by the specialist or the GP when I was on Prednisolone, and then I did the weightlifting. I cracked my L2 and L5. Later on they told me oh, that could affect your bone. It's too late. –Male patient, AUS They didn't say okay, you can't have babies. Thanks for letting me know, you know? –Male patient, UK
Managing triggers and driving factors	We manage disease, but we don't actually make people healthy...the pillars of health are diet, sleep, movement and exercise and stress management, and that if you get those things right, the body has an amazing capacity to heal itself if you nourish all of those things. –Female carer, AUS I picked kidney function as number one, because all the other conditions come from kidney failure, and if your kidneys are working, you won't have any of that. –Female patient, UK In my case stress, anxiety and depression. I have anger issues and if I keep them under control my medical condition will get better. Because if I'm able to control those, I'll be able to control my medical condition. In the second place, my ability to work, my finances, if I'm able to control that, I'll have a positive response to my treatment. Death is the least important to me. –Male patient, USA Dialysis and death doesn't really worry me because it's something I can't control. Anxiety and stress. Time to dialysis and transplant is uncontrollable...The stress of worrying about it is more important... It's the stress and anxiety of not being able to control something. –Male patient, AUS
Threats to future self and family	
Subthemes	
Adaptability to diverging expectations	[Anxiety, cognitive function] Your life changes completely when you get all this crap. Completely changes. Changes you. I don't feel like I am the same person. My brain doesn't work anymore. –Female patient, UK The dialysis word is a very scary word...I went you know what, we can live with this. It's not something that's going to define my life completely, there are still going to be options. –Female patient, UK

	<i>[Life participation]</i> It was more like, you're not going to go back to that. You need to learn how to go around and come back. To me, the first couple years I was angry. This is really an inconvenience. That's why my first word was frustrated. – <i>Female patient, USA</i>
<i>Endangering life goals</i>	My mum's a teacher and she's been teaching for 45 years, and I would love to be able to do that. I think that's why it's different. It's not a usual activity for me, it's something else. – <i>Female patient, AUS</i> We found out when I was 30 weeks pregnant...I was hospitalized. Sorry, no more children. That's the end. That was a big impact for us. – <i>Female patient, AUS</i> You can't work, so your income isn't what you envisaged it was going to be...when you thought you were contributing to your pension. All of a sudden it's wiped out. – <i>Male patient, UK</i>
<i>Inevitable, irreversible consequences</i>	Eventually you're going to end up with dialysis or transplant. Everything else fits in around that. My end result is this. – <i>Male patient, AUS</i> Dialysis in one year's time, probably a kidney transplant in future. That will be my story. – <i>Male patient, AUS</i> I'm unlucky...The doctor told me that the kidney wouldn't get well by itself. It'll just get worse and worse. I feel very worried about that. – <i>Female patient, HK</i>
<i>Uncertainty and unpredictable hazards</i>	You definitely need to know whether or not it's going to get back to that remission again, or you're just going to continue on having these ups and downs all the time. – <i>Male patient, AUS</i> When you're on dialysis, anything could happen. – <i>Female patient, USA</i> Predictability. I'm looking at it from my perspective as a mother and a caregiver. It affects the whole thing, like her future, her health status, financial-wise, whatever. – <i>Female caregiver, AUS</i>

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kidney disease stage.

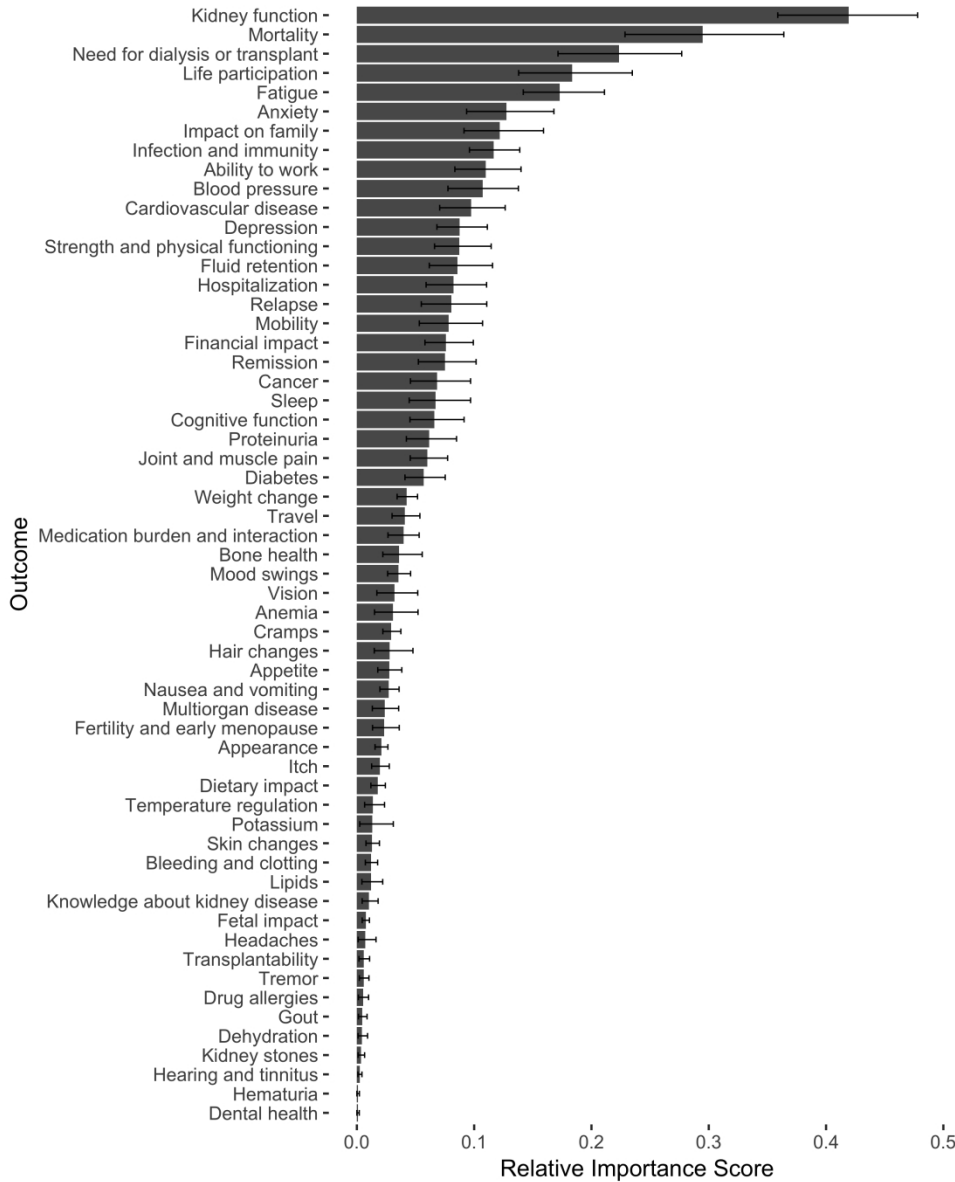
For Peer Review

Figure Legend

Figure 1. Overall ranking of outcomes by importance score with error bars representing the 95% confidence interval.

Figure 2. Thematic schema indicating how the themes underpin prioritization of outcome groups.

For Peer Review



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**Threats to future
self and family**

**Constraining
day-to-day
existence**

Kidney health

**Mortality and
life threatening
comorbidity**

**Life impact,
role functioning
and fatigue**

Mental health

**Other clinical
and
biochemical
outcomes**

Theme explained higher prioritization

**Impaired agency
and control
over health**

Which outcomes matter to patients with glomerular disease and their caregivers?

Methods and cohort

Australia
Hong Kong
United Kingdom
United States

10
1
33
Caregivers

Patients with glomerular disease
Aged 19-85
51% female

16 focus groups
58 outcomes identified

Outcomes scored
Between 0 and 1

Emerging themes

Impaired
Threat
Expert
Control
Future
Over
Health
and
family

Highest ranking outcomes and scores (0-1)

 0.42 Kidney function	 0.29 Mortality	 0.22 Dialysis/ transplant requirement	
 0.18 Life participation	 0.17 Fatigue	 0.13 Anxiety	
 0.12 Family impact	 0.12 Infection and immunity	 0.11 Ability to work	 0.11 Blood pressure

Conclusions

Patients with glomerular disease and their caregivers highly prioritize kidney health and survival, but also life participation, fatigue, anxiety and family impact.

Simon Carter, Talia Gutman, Charlotte Logeman, Dan Cattran, et al. *Identifying Outcomes Important to Patients with Glomerular Disease and Their Caregivers*. CJASN doi: 10.2215/CJN.13101019. Visual Abstract by Michelle Lim, MBChB, MRCP

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SONG-GD Focus group run sheet (full)

Time	Details
Welcome and introduction	
10 mins	Welcome <i>[conversational tone]</i> Good [morning/afternoon/evening] everyone. My name is _____ from The University of Sydney in Australia. Thank you for attending this meeting to discuss your experiences and perspectives of either living with glomerulonephritis or caring for someone with glomerulonephritis. Is everyone ok if I refer to it as GN? Project aims Today we would like to find out from you what outcomes you think should be reported in clinical trials. Have any of you participated in a clinical trial/have heard of a trial? Researchers do trials to evaluate the effect of different treatments. For example, they may do this by giving one group treatment A and the other group treatment B, and then measure what happens - the outcomes we're interested in. Typically, researchers decide what outcomes to measure, and patients, family members/caregivers are not usually involved. We don't really know if the outcomes being reported are those that matter most to patients. We have invited you here because you have experience living with glomerulonephritis. We want you to share insights from your own personal experiences and perspectives (both good and bad). Later we'll get on to what outcomes you think are important to measure in research and why. The goal of this session is to identify outcomes that are important to you, and to understand the reasons for why they are important to you. This is so when trials in the future are planned and performed, they include outcomes that matter to you. Glomerulonephritis has many different causes. Some people here might have IgA nephropathy, membranous, minimal change, FSGS, ANCA-associated or lupus nephritis to name just a few. They often affect the kidney in a similar way and may be treated similarly. But there will be a large range of experiences heard today that may be quite different to your own. People will be at different stages of life (for example, having a family, retirement or studying at university!). Things that happen to someone else may not happen to you. We would invite you to view these differences between each of you during the session as a strength of this project. Sometimes differences might tend to make people feel a little alone or isolated. Sometimes it can be upsetting and confronting to hear people's stories. But our major job today is to make sure we collect the views and opinions of a wide range of people with different glomerulonephritis, different ages and with different kidney function. We don't want to leave any really important experiences out. Confidentiality and voluntary participation What you tell us will be recorded to save us from writing down everything that is being said and it will be kept confidential. Nothing you say will be traced back to you. Please be respectful of other people and we would ask you do not repeat other people's comments outside of the group. Only the group data will be reported. Also, what you say will not affect the medical care you receive. Please note that we will not be providing any medical advice today. If the discussion raises questions for your situation we would suggest making a note and raising it with your kidney specialist. You are free to leave at any time without having to provide a reason.

	Also, because this session is being taped, it is very important that we do not talk at the same time or our transcriptionist will not be able to transcribe what is being said. If that happens, I may have to interrupt and ask for one person to speak at a time. Ice breaker To start, we will go around and if you could please say: - Your name - The first word that comes to mind when someone mentions your kidney disease? - Something nice that's happened to you recently
Phase 1 – Focus group discussion (25 mins)	
25 mins	Focus Group To begin with, we will talk about your general experiences of glomerulonephritis. IMPACT: What are the major features that affect you day-to-day? What are most challenging to deal with, why – how do you cope with it? (PROMPT: For example, some people may have a risk of relapses. Some people may have lots of swelling from losing lots of protein, and other may have medication challenges, worry about the future) <i>[Facilitator to note any outcomes mentioned to use as examples later in Phase 2]</i>
Phase 2 – Nominal group technique (35 mins)	
35 mins	Nominal Group Technique (Part 1) Now we are going to have a more focused discussion and an activity to find out what outcomes (<i>complications, symptoms</i>) matter to you most and why. I am going to read you a question. Afterwards, I would ask that you take a couple of minutes to write down <u>three</u> ideas (by yourself) on the paper provided to the question shown on the flip chart. This is the question: "If researchers wanted to evaluate two different types of treatments for people with glomerulonephritis (e.g. medications, lifestyle, psychosocial etc); what do you think they need to study (measure) in order to determine which one is 'better' for you/your family/for other patients?" <i>[Give examples of outcomes from the discussion e.g. kidney function, medication tolerability, relapses or remission]</i> Please write down your 2-3 outcomes that you think are important to be measured in clinical trials, then we will share them with each other and generate a group list on the board/flipchart. I am going to go around the table and ask each of you to give me one or two ideas from your worksheet, summarised in a few words. After the entire list is on the board, we will discuss and clarify the ideas. Please do not repeat an idea already listed on the board. You can offer a different idea or you can pass. <i>[Facilitator note: please be specific – e.g. QOL is too broad, identify a specific outcome]</i> We will now briefly discuss each idea, to clarify the meaning of each item on the board/flipchart as I write them up. You should feel free to express different points of view as people will have different experiences and perspectives. Does anyone have any other outcomes they would like to add before I start adding outcomes other patients have told us in the past and outcomes that have been reported in trials in GN. <i>[Write them on the flip chart if participants think it is important, read them out and clarify].</i>
10 mins	<u>Break</u> Print list of outcomes for ranking.
25 mins	<u>Nominal Group Technique Part 2</u>

	Now we are going to look at all the ideas raised by the group and I will ask you to rank them in order of most important to least important to you from 1 being most important. If you find it difficult to rank the whole list, please try to rank the top 20. Now we will have a discussion to discuss any similarities and differences in ranking. What did everyone put as: number 1, number 2, number 3, least important? Would anyone like to explain why they ranked [outcome] or how they made their decisions about ranking? Why do you think most people ranked [outcome] high/low? Why do you think there are differences in ranking of [outcome]?
15 mins	<i>Ownership/control and self-management:</i> To what extent do you feel like you have control/ownership over your kidney health - why? Is there anything that you do to “manage” your health – why? Do you feel the need to have access to research figures and numbers to you in making decisions about your health? What are your preferences about accessing this information? (i.e. online, healthcare provider or some other way) What the biggest challenges in managing your health, how do you cope? What are your health goals in the short term (up to 3 years) and in the longer term; and is there anything you are thinking of/or doing in view of these goals?
1 min	Wrap up <i>Wrap up, acknowledgement and presentation of compensation.</i> <i>Thank you and closing remarks.</i>

Supplemental methods:

Importance score: As each group generated and ranked a different list of outcomes, an importance score was used to prioritize the outcomes, based on the participant's rank assigned to each outcome. The distribution of the ranking for each outcome was obtained by calculating the probability of each rank for each outcome [$P(O_j \text{ in rank } i)$, i.e., the probability of the outcome O_j being assigned the rank first place, second place and so on]. By the total law of probabilities:

$$\begin{aligned} P(O_j \text{ in rank } i) &= \\ &= P(O_j \text{ in rank } i | O_j \text{ is nominated}) \times P(O_j \text{ is nominated}) \\ &+ P(O_j \text{ in rank } i | O_j \text{ not nominated}) \times P(O_j \text{ not nominated}) \end{aligned}$$

where “nominated” means that the outcome was considered (and given a rank) by the participant.

We assumed that the $P(O_j \text{ in rank } i | O_j \text{ not nominated})$ is 0, because if the participant did not rank the outcome O_j , then the probability of any rank is 0. Therefore, the equation is simplified to:

$$P(O_j \text{ in rank } i) = P(O_j \text{ in rank } i | O_j \text{ is nominated}) \times P(O_j \text{ is nominated})$$

The probability includes: 1) the importance given to the outcome through ranking and 2) the consistency of being nominated by the participants. We obtained the importance score by computing the weighted sum of the inverted ranking ($\frac{1}{i}$).

$$IS = \sum_{i=1}^{nr \text{ of } outcomes} P(O_j \text{ in rank } i) \times \frac{1}{i}$$

The importance score (0-1), represents a summary measure of the importance of the outcome that incorporates the consistency of being nominated and the rankings given by the participants. The ranks are inverted, such that more weight is given to top ranks and less to lower ranks. Outcomes that are more valued by participants therefore have higher scores. The importance score is equivalent of taking the mean of the reciprocal ranks for an outcome across all groups and has a value between 0 and 1.

Supplemental Table 1. Self-reported comorbid conditions of patient participants.

	Australia n= 38 (%)	Hong Kong n=16 (%)	United Kingdom n=24 (%)	United States n=23 (%)	All N=101 (%)
Diabetes	7 (18)	1 (6)	3 (13)	7 (30)	18 (18)
Depression or anxiety	6 (16)	3 (19)	3 (13)	4 (17)	16 (16)
Obesity	5 (13)	1 (6)	3 (13)	5 (22)	14 (14)
Asthma	7 (18)	1 (6)	0 (0)	1 (4)	9 (9)
Cardiovascular disease	3 (8)	2 (13)	1 (4)	2 (9)	8 (8)
Any cancer	2 (5)	0 (0)	3 (13)	1 (4)	6 (6)
Stroke	1 (3)	0 (0)	1 (4)	1 (4)	3 (3)

1 patient (UK) had missing comorbidity data

Supplemental Table 2. Top ten outcomes of patient and caregivers.

Patient (n=101)		Caregiver (n =33)	
Outcome	Importance score (SE)	Outcome	Importance score (SE)
Kidney function	0.40 (0.04)	Kidney function	0.47 (0.07)
Mortality	0.29 (0.04)	Mortality	0.31 (0.07)
Need for dialysis or transplant	0.24 (0.03)	Life participation	0.19 (0.05)
Life participation	0.18 (0.03)	Need for dialysis or transplant	0.18 (0.05)
Fatigue	0.17 (0.02)	Fatigue	0.18 (0.04)
Infection and immunity	0.12 (0.01)	Cardiovascular disease	0.15 (0.04)
Anxiety	0.12 (0.02)	Anxiety	0.15 (0.04)
Impact on family	0.12 (0.02)	Blood pressure	0.13 (0.04)
Ability to work	0.11 (0.02)	Impact on family	0.13 (0.03)
Blood pressure	0.10 (0.02)	Relapse	0.10 (0.03)

Outcomes included in top ten across groups are in bold.

Supplemental Table 3. Top ten outcomes by sex.

Male (n=66)		Female (n =68)	
Outcome	Importance score (SE)	Outcome	Importance score (SE)
Kidney function	0.41 (0.04)	Kidney function	0.43 (0.05)
Mortality	0.31 (0.05)	Mortality	0.28 (0.04)
Need for dialysis or transplant	0.25 (0.04)	Need for dialysis or transplant	0.20 (0.03)
Life participation	0.17 (0.03)	Life participation	0.20 (0.04)
Fatigue	0.17 (0.03)	Fatigue	0.18 (0.02)
Impact on family	0.14 (0.03)	Anxiety	0.14 (0.03)
Blood pressure	0.13 (0.03)	Ability to work	0.14 (0.03)
Infection and immunity	0.12 (0.02)	Infection and immunity	0.11 (0.02)
Anxiety	0.12 (0.03)	Impact on family	0.11 (0.02)
Fluid retention	0.10 (0.02)	Cardiovascular disease	0.10 (0.02)
Outcomes included in top ten across groups are in bold.			

Supplemental Table 4. Top ten outcomes by age.

Age less than 51 years (n=66)		Age 51 years and older (n =67)	
Outcome	Importance score (SE)	Outcome	Importance score (SE)
Kidney function	0.45 (0.05)	Kidney function	0.39 (0.04)
Mortality	0.31 (0.05)	Mortality	0.28 (0.05)
Need for dialysis or transplant	0.23 (0.04)	Life participation	0.22 (0.04)
Life participation	0.15 (0.02)	Need for dialysis or transplant	0.21 (0.04)
Ability to work	0.14 (0.03)	Fatigue	0.21 (0.03)
Fatigue	0.14 (0.02)	Anxiety	0.15 (0.03)
Impact on family	0.12 (0.03)	Infection and immunity	0.13 (0.02)
Cardiovascular disease	0.12 (0.02)	Impact on family	0.12 (0.02)
Fluid retention	0.10 (0.03)	Blood pressure	0.12 (0.02)
Anxiety	0.10 (0.01)	Mobility	0.10 (0.02)

Outcomes included in top ten across all groups are in bold. One patient missing age.

Supplemental Table 5. Top ten outcomes by country.

Australia (n=50)		Hong Kong (n =22)		United Kingdom (n =29)		United States (n = 33)	
Outcome	Importanc e score (SE)	Outcome	Importan ce score (SE)	Outcome	Importan ce score (SE)	Outcome	Importan ce score (SE)
Kidney function	0.45 (0.05)	Kidney function	0.59 (0.08)	Mortality	0.37 (0.07)	Mortality	0.35 (0.07)
Need for dialysis or transplant	0.28 (0.05)	Mortality	0.32 (0.10)	Life participation	0.36 (0.08)	Kidney function	0.31 (0.06)
Mortality	0.21 (0.04)	Blood pressure	0.31 (0.05)	Kidney function	0.35 (0.07)	Need for dialysis or transplant	0.28 (0.05)
Life participation	0.17 (0.03)	Impact on family	0.19 (0.06)	Fatigue	0.23 (0.04)	Cardiovascular disease	0.20 (0.04)
Fatigue	0.16 (0.03)	Need for dialysis or transplant	0.16 (0.03)	Mobility	0.15 (0.04)	Anxiety	0.18 (0.05)
Anxiety	0.14 (0.03)	Fatigue	0.15 (0.02)	Impact on family	0.14 (0.04)	Cancer	0.17 (0.04)
Infection and immunity	0.12 (0.02)	Life participation	0.15 (0.05)	Need for dialysis or transplant	0.12 (0.04)	Ability to work	0.16 (0.04)
Hospitalization	0.11 (0.02)	Financial impact	0.15 (0.05)	Relapse	0.10 (0.04)	Fatigue	0.15 (0.03)
Proteinuria	0.10 (0.02)	Infection and immunity	0.14 (0.03)	Remission	0.10 (0.04)	Relapse	0.14 (0.04)
Blood pressure	0.10 (0.02)	Cardiovascular disease	0.13 (0.03)	Infection and immunity	0.10 (0.02)	Diabetes	0.12 (0.02)

Outcomes included in top ten across all groups are in bold

Supplemental Table 6. Top ten outcomes by stage of kidney disease.

Chronic kidney disease (n = 66)		Dialysis or transplant (n = 29)	
Outcome	Importance score (SE)	Outcome	Importance score (SE)
Kidney function	0.39 (0.04)	Kidney function	0.42 (0.07)
Need for dialysis or transplant	0.30 (0.04)	Mortality	0.38 (0.08)
Mortality	0.28 (0.04)	Life participation	0.24 (0.06)
Fatigue	0.15 (0.03)	Fatigue	0.19 (0.03)
Life participation	0.15 (0.03)	Blood pressure	0.17 (0.04)
Infection and immunity	0.14 (0.02)	Need for dialysis or transplant	0.13 (0.04)
Ability to work	0.13 (0.03)	Financial impact	0.12 (0.04)
Anxiety	0.13 (0.03)	Anxiety	0.12 (0.03)
Impact on family	0.13 (0.02)	Impact on family	0.12 (0.03)
Depression	0.10 (0.02)	Sleep	0.11 (0.04)

Outcomes included in top ten across all groups are in bold. Six patients had missing data.

Supplemental Table 7. Top ten outcomes by glomerular disease sub-group.

Kidney-limited glomerular disease (n=50)		Glomerular disease with associated systemic disease (n = 38)	
Outcome	Importance score (SE)	Outcome	Importance score (SE)
Kidney function	0.36 (0.05)	Kidney function	0.40 (0.05)
Need for dialysis or transplant	0.36 (0.06)	Mortality	0.34 (0.07)
Mortality	0.29 (0.05)	Life participation	0.20 (0.05)
Fatigue	0.14 (0.03)	Fatigue	0.20 (0.04)
Life participation	0.14 (0.03)	Anxiety	0.15 (0.04)
Ability to work	0.13 (0.03)	Need for dialysis or transplant	0.13 (0.03)
Infection and immunity	0.12 (0.02)	Infection and immunity	0.13 (0.03)
Impact on family	0.11 (0.03)	Depression	0.11 (0.02)
Anxiety	0.11 (0.03)	Cardiovascular disease	0.11 (0.03)
Relapse	0.10 (0.03)	Cognitive function	0.10 (0.03)

Outcomes included in top ten across all groups are in bold. Thirteen patients were excluded because they were unsure of their type of disease.

Supplemental Table 8. Top ten outcomes for predominantly proteinuric kidney-limited disease.

Proteinuric kidney-limited glomerular diseases* (n=21)	
Outcome	Importance score (SE)
Need for dialysis or transplant	0.39 (0.08)
Kidney function	0.33 (0.07)
Mortality	0.24 (0.07)
Ability to work	0.20 (0.07)
Remission	0.15 (0.05)
Relapse	0.14 (0.05)
Fluid retention	0.13 (0.04)
Anxiety	0.12 (0.05)
Fatigue	0.12 (0.02)
Depression	0.12 (0.05)

*Focal segmental glomerulosclerosis, membranous nephropathy and minimal change disease