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Nephrology-tailored geriatric assessment as decision-making tool in kidney failure

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Abstract

Background: Dialysis might not benefit all older patients with kidney failure, particularly those with multimorbid conditions and frailty. Patients' and healthcare professionals' awareness of the presence of geriatric impairments could improve outcomes by tailoring treatment plans and decisions for individual patients.

Objective: We aimed to explore the perspectives of patients and healthcare professionals on nephrology-tailored geriatric assessment to fuel decision-making for treatment choices in older patients with kidney failure.

Design: In an exploratory qualitative study using focus groups, participants discussed perspectives on the use and value of nephrology-tailored geriatric assessment for the decision-making process to start or forego dialysis.

Participants and Measurements: Patients (n = 18) with kidney failure, caregivers (n = 4), and professionals (n = 25) were purposively sampled from 10 hospitals. Interviews were audio-recorded, transcribed verbatim and inductively analysed using thematic analysis.

Results: Three main themes emerged that supported or impeded decision-making in kidney failure: (1) patient psycho-social situation; (2) patient-related factors on modality choice; (3) organisation of health care. Patients reported feeling vulnerable due to multiple chronic conditions, old age, experienced losses in life and their willingness to trade longevity for quality of life. Professionals recognised the added value of nephrology-tailored geriatric assessment in three major themes: (i) facilitating continual holistic assessment, (ii) filling the knowledge gap, and (iii) uncovering important patient characteristics.

Conclusions: nephrology-tailored geriatric assessment was perceived as a valuable tool to identify geriatric impairments in older patients with kidney failure. Integration

[Correction added on 15 April 2023, after first online publication: The middle and last name of the author Anja H. Brunsveld-Reinders has been corrected in this version.]

of its outcomes can facilitate a more holistic approach to inform choices and decisions about kidney replacement therapy.

KEYWORDS

geriatric assessment, kidney failure, kidney replacement therapy, older patients, shared decision-making

INTRODUCTION

Dialysis is an extremely burdensome therapy that considerably impacts patients' lives. Older patients with chronic kidney disease (CKD) stage G4-G5, eGFR <20 mL/min/1.73 m^2 with multiple chronic conditions are particularly at risk for cognitive and functional decline which leads to a high risk of mortality and poor quality of life (QOL) (Kallenberg et al., 2016; Kurella Tamura et al., 2009; van Loon et al., 2016). Within this group, it remains unclear who might benefit from dialysis and for whom conservative care can be an acceptable alternative (O'Connor & Kumar, 2012). In addition, there is a high incidence of withdrawal from dialysis in this older group (L. Brown et al., 2016; Foote et al., 2016; Hussain et al., 2015; van Oevelen et al., 2021b).

LITERATURE REVIEW

Decision-making about kidney replacement therapy (KRT) in older patients with CKD stage G4-G5 is highly complex because of multiple health issues such as multimorbidity, increased mortality, loss of functional status, cognitive impairment and diminished QOL. Discussions about KRT can be very stressful and nephrology multidisciplinary teams are tasked with helping patients decide which treatment fits an individual's preferences and goals alongside weighing the benefits against the burdens of KRT (Schell & Cohen, 2014).

Fundamental to the decision-making process is collaboration between all those involved and provision of trustworthy information about all options whereby personal circumstances, concerns and contexts of patients and their families are taken into account (Morton et al., 2010; Williams et al., 2012).

Multidisciplinary assessment of older people with CKD stage G4-G5 is recommended in guidelines (Farrington et al., 2017). This recommendation includes assessing frailty, cognitive function, comorbidities, nutritional, psycho-social and physical function domains. These domains are all part of comprehensive geriatric assessment (CGA), the quintessence of geriatric medicine and governed by a geriatrician (Stuck et al., 1993) (for details about CGA, see Figure 1). However, full CGA is time-consuming and challenging to implement into routine care of older patients

Domain	Sub domain	Instrument used for CGA
Functional	Functional status Mobility	ADL; iADL Gait speed ;Handgrip strength; Timed up and go; Falls
Cognitive	Cognition Neuropsychological assessment	MMSE; MOCA;Clock drawing 15- WVLT; Stroop Colour Word Test; Trail making test (A&B); VAT; LDST
Psychological	Mood	GDS
Somatic	Comorbidity Frailty Nutritional status Polypharmacy	Charlson Comorbidity Index; CIRS-G Fried frailty indicator; Canadian clinical frailty scale SGA or SNAQ
Social	Caregiver burden	EDIZ-plus
Other	Quality of life	RAND-36; EQ-5D; Cantril's ladder; Pain score, Anxiety score

FIGURE 1 Comprehensive geriatric assessment (CGA). An Illustration of core elements of CGA carried out by geriatrician and multidisciplinary geriatric team with examples of assessments which may be used. 15-WVLT, 15-word verbal learning test, immediate and delayed; ADL, activities of daily living; CIRS-G, cumulative illness rating scale for geriatrics; EDIZ, 'Ervaren Druk door Informele Zorg' self perceived burden from informal care; EQ-5D, EuroQol Instrument; GDS, 15-item geriatric depression scale; iADL, instrumental activities of daily living; LDST, letter digit substitution test; MMSE, mini mental state examination; MOCA, Montreal cognitive assessment; RAND-36, the RAND 36-item health survey 1.0; SGA, subjective global assessment; SNAQ, short nutritional assessment questionnaire; VAT, visual association test.

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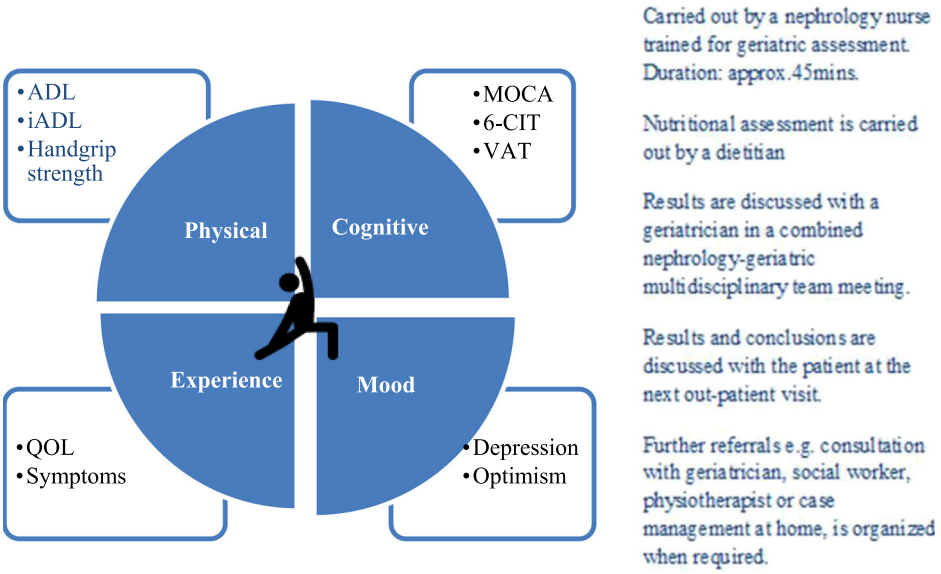

FIGURE 2 Nephrology-tailored geriatric assessment (NGA). An illustration of a NGA with examples of assessments which may be used. 6-CIT, six-item cognitive impairment test; ADL, activities of daily living; DSI, dialysis symptom index; GDS, 15-item geriatric depression scale; iADL, instrumental activities of daily living; MNA, mini nutritional assessment; MOCA, Montreal cognitive Assessment; QOL, quality of life, using SF-12: The Short Form (12) health survey. Nutritional assessment; SGA, subjective global assessment; VAT, visual association test.

with CKD stage G4-G5 as it takes about 2 h, the involvement of a geriatrician and an integrated treatment plan (Parker et al., 2017). So new initiatives have emerged to screen outpatients for impairments in all domains without involvement of Geriatric Medicine (Parker et al., 2017). In nephrology, several initiatives reported on using a modified (nephrology-tailored) geriatric assessment (NGA) (for details about NGA, see Figure 2) (E. A. Brown & Farrington, 2019; Goto et al., 2019; Hall et al., 2016; Nixon et al., 2021; Novais et al., 2021; Voorend et al., 2021b). Such a modified assessment could help to recognise patient-led and patient-driven goals, identify patients who would benefit from referral to a geriatrician for full CGA and contribute to a complete holistic patient portrayal. Yet it is unknown if and how these geriatric assessments facilitate decision-making about choices for KRT.

Previous qualitative studies have revealed perspectives of older patients with CKD stage G4-G5 about treatment choices (Mandel et al., 2017; Pel-Littel et al., 2021; Raj et al., 2019; van de Luijtgaarden et al., 2013; van Loon et al., 2015) and professionals perspectives on factors influencing decision-making (Hall et al., 2016). To our knowledge, patients' and professionals' perspectives on how NGA can play a role in decision-making about KRT have not yet been studied.

The aim of the present study was first to describe patients' and professionals' perspectives on decision-making about KRT in older patients with kidney failure while using NGA. Second, to identify factors which support or impede decision-making and thirdly to explore the experienced added value of NGA in decision-making. Such in-depth knowledge could improve decision-making for older patients with CKD stage G4-G5 and benefit potential future implementation of NGA.

METHODOLOGY

We performed an exploratory qualitative study approved by Medical Research Ethics Committee (Voorend et al., 2021a). The study population covered healthcare professionals and older persons with CKD stage G4-G5, who experienced geriatric assessment during (their) build-up to KRT decisions. We use the term 'geriatric' only when referring to the 'tool' or speciality of 'geriatrics'. To enable discussions and interaction between patients and caregivers and between professionals and to understand commonalities and differences in perspectives we conducted focus groups. (Voorend et al., 2021a).

Population and sampling

Patients were purposively sampled and eligible when exposed to NGA during their build-up to KRT decisions, aged ≥65 years, with CKD stage G4-G5 eGFR ≤20 mL/min/1.73 m^2, or a recent kidney transplantation. Caregivers who usually accompanied a patient were also invited to join the focus groups. The sampling methods were described previously in Voorend et al. (2021a). In short, participants were approached from three different NGA initiatives (Berkhout-Byrne et al., 2017b; Goto et al., 2019). All three practices used various geriatric measures in multiple domains (e.g., functional, cognitive, psycho-social, and somatic status) for study- or routine-care purposes. All initiatives included patients above 65 years of age with CKD stage G4-G5, (either eGFR <20 or <15 mL/min/1.73 m^2). Patients were approached by their treating (study) physician and purposively sampled with different (future) choices of treatment modality that is, KRT or CKD G5 without KRT or CKD G1T-G5T after transplantation (maximum variation

TABLE 1 Participant characteristics.

	Patients (*N* = 18)	Caregivers (*N* = 4)	Professionals (*N* = 25)
Age in years, mean (range)	79 (67–88)	60 (51–76)	48 (29–61)
Sex, male	9 (50%)	0 (0%)	4 (16%)
Children, yes	17 (94%)		
Civil status			
Married/living together with partner	10 (56%)		
Widow/no partner	8 (45%)		
Living situation			
Independent	12 (67%)		
Independent with care facilities (e.g., care at home, alarm bell or assistance in housework)	6 (33%)		
Education level			
Primary or secondary education	6 (34%)		
Secondary vocational education	5 (28%)		
Higher professional/university education	7 (39%)		
Treatment status			
Haemodialysis/peritoneal dialysis, *n* (months since start)	5 (2–21, mean 11.6)		
Transplantation, *n* (months since transplantation)	3 (4–32; mean 15.3)		
CKD stage 4/5 not on KRT, *n*	10		
Future choice (if in CKD stage 4/5, not on KRT), *n*			
Haemodialysis/peritoneal dialysis	3		
Transplantation	2		
Conservative kidney management	2		
Multiple modalities open or no decision made	3		
Time since last geriatric assessmen–t, in months, median (range)	5.5 (0.6-14.3)		
Experience in care for 65+ CKD patients[a], in years, median (range)			5.5 (0.5–28.3)
Profession			
Nephrologist			7 (28%)
Geriatrician			4 (16%)
Nephrologist/geriatrician			2 (8%)
Nurse practitioner			2 (8%)
Nurse (nephrology)			3 (12%)
Nurse (other)			2 (8%)
Social worker			4 (16%)
Dietician			1 (4%)
Academic hospital	13 (72%)	3 (75%)	15 (60%)
Regional hospital	5 (28%)	1 (25%)	10 (40%)

Note: For more details about the time since last geriatric assessment see (Voorend et al., 2021a). Abbreviations: CKD, chronic kidney disease; KRT, kidney replacement therapy.

[a]The self-reported number of years professionals were involved in the care of patients with chronic kidney disease, particularly with patients CKD without KRT, or kidney failure with or without KRT.

sampling). Professionals were recruited through a combination of purposive and snowball sampling related to these same initiatives. We aimed to include all multidisciplinary perspectives (i.e., nephrologists, geriatricians, nurse practitioners, dialysis nurses, social workers and dieticians) (see Table 1 for participant characteristics). The study's purpose, procedure and confidentiality was written in an information letter and sent to all potential participants, after which informed consent was given.

Relationship with participants

We ensured that none of the patients were being treated by the interviewer. The interviewer defined her role as researcher at the start of all interviews. Although the interviewer is an advocate of NGA the research team agreed that there were clear benefits to her conducting the interviews as opposed to a person with no experience with NGA.

TABLE 2 Focus group topic guide.

Following welcoming of participants, clarification of purpose and procedure including confidentiality of focus group discussion was given. Purpose of focus groups: There is a need of standardised tests and questionnaires which can support patients with CKD stage G4-G5 > 65 years and professionals in decision-making process about kidney replacement therapy (KRT) in kidney failure

Type question	Question	Probe
Opening question	1. In what way should care differ for patients with kidney failure above 65 years of age, compared to patients of a younger age?	Probe for aspects missing in kidney failure care of older patients.
Transition question	2. What does a patient [and professional] need to enhance the treatment decision-making process?	Probe for type of information and education needed, who is important in decision-making process in kidney failure?
Central questions (3–8) Experiences performing tests and questionnaires	3. How did you experience doing the geriatric tests [from patient and professional perspective]?	Probe for: Impact: confrontation with results, stress, worry, psychological experience or burden Feasibility: frequency, setting, caretakers, way of assessing, specific tests, setting (home or hospital), presence of family/caregiver; questionnaires digital/paper?
Added value to decision-making process	**4. To what extent do you think geriatric care (i.e., geriatric tests, consultation and advice of geriatrician) contributed to the regular nephrology care?**	**Probe for: collaboration between nephrology and geriatric department, contact with the geriatrician, impact of the tests, including effect KRT choice.**
	5. Which factors play an important role for older patients in kidney failure care and decision-making for KRT?	**Probe for: factors in geriatric domains (social, psychological, somatically and functional), role of partner and family, other influences and crucial aspects in decision-making.** **Further line of inquiry:** **What is crucial in your decision? Give specific examples for example, does your partner agree with your choice for PD?**
	6. To what extent did the results of the geriatric assessment influence treatment choice (KRT) [from a patient and professional view]?	**Probe for: experience with specific tests**
Potential barriers and facilitators	7. Which barriers would you expect if a geriatric assessment is introduced in routine care of older patients with kidney failure? Which facilitators could you foresee? Please write down three main barriers and three main facilitators.	Probe for: general aspects (psychological, social, organisational barriers and facilitators) and specific aspects (intrinsic/extrinsic psychological barriers and facilitators)
The ideal test battery	8. If you had the chance to design your own programme to screen older patients with kidney failure, which tests would you definitely include?	Probe for: reasons for specific preferences, practical issues, patient-related factors, what is needed for successful implementation
Closing question	9. Did you miss a topic in this conversation on nephrogeriatric care? Is there anything you would like to add?	

Note: Interview questions relevant to decision-making about KRT are highlighted in bold.

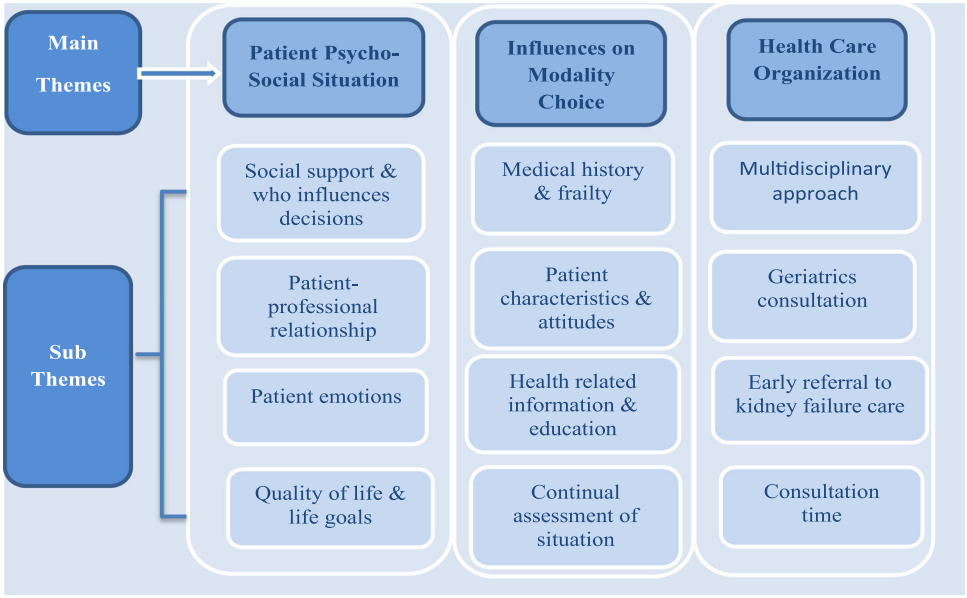

FIGURE 3 Supporting and impeding factors to decision-making in CKD G4-G5.

Data collection (interview design and procedure)

A semistructured interview topic guide was developed comprising questions from a brainstorming session between two experienced researchers in nephro-geriatric care and one in qualitative research (see Table 2). The topic guide was further informed by literature (Kallenberg et al., 2016; Litosseliti, 2003; Nixon et al., 2021; van Loon et al., 2016) and approved by a group of nephrologists and geriatricians with extensive experience in the field of older patients with CKD G4-G5. Guiding questions were designed to prompt views on:

1. Patients' and professionals' needs to enhance the treatment decision process.
2. Factors that play a role in decision-making for KRT.
3. Consequences of NGA on treatment choice and decision-making process (see Table 2). The topic guide was further elaborated in an instruction manual that contained detailed information on objectives, planning, focus (for moderator and observer), introduction and different types of questions for example, key questions, transition questions etc. At three centres, two focus groups were held: one with patients and one with professionals. A female nurse practitioner (NB) with 40 years of experience in clinical nephrology and 7 years in geriatric nephrology was trained to conduct focus groups and led all discussions. The focus groups lasted for 2.5 h including a break. An observer was present and took notes. Finalising each focus group, the interviewer provided a summary of the conversation to the participants verifying their different views on the main topics. In addition, sociodemographic data (for patients: date of birth, gender, civil status, living situation, education level, treatment modality or future modality choice, the treating hospital; for health care professionals: date of birth, sex, profession, hospital of origin, years of experience in nephrology/geriatric care) was collected on the day of the focus groups.

Data analysis

All interviews were audio-recorded, transcribed verbatim and inductively analysed using thematic analysis (Braun & Clarke, 2006). Two authors coded separately (Noeleen C. Berkhout-Byrne and Carlijn G. N. Voorend) followed by a discussion of the themes. Additional checks on the consistency of the coding scheme was performed by two other authors (Marjolijn Van Buren and Yvette Meuleman) and inconsistencies were discussed and adjusted afterwards. Further analysis was done by the first author in close collaboration with the other authors. Throughout the entire analysis process the research team iteratively reviewed and critically discussed interpretations until they reached consensus. Data saturation was assessed at different stages of the analysis until agreement was reached (i.e., until no new information was obtained or new themes emerged) (Braun & Clarke, 2021). Translation of selected illustrative quotes was performed by a native English speaker (Noeleen C. Berkhout-Byrne) using back-translation. No qualitative software package was used for coding transcripts. Coding books, memo's and analyses were documented digitally and all data was saved on a secure server at the leading centre. To describe patients' characteristics, descriptive statistics were computed using SPSS (IBM, version 25). Recommended guidelines and checklists (e.g., the Consolidated Criteria for Reporting Qualitative Studies) were used to conduct and report this study (Amir et al., 2021; Tong et al., 2007) (see extra information in Supplement 1. Methodology).

FINDINGS

Six focus groups were carried out with in total 47 participants (7–9 participants per focus group), with a response rate for professionals 83%, for patients 85%. Reasons for nonparticipation included travel restrictions, not being available on the focus group date and personal reasons. Professionals ($n = 25$) related to three academic and seven regional hospitals represented all disciplines of the nephrogeriatric team. Three groups were held with patients ($n = 22$) and caregivers ($n = 4$) whereby five patients had started dialysis and three patients had received kidney transplantation. Baseline participant characteristics are listed in Table 1.

PERSPECTIVES ON FACTORS WHICH PLAY AN IMPORTANT ROLE IN DECISION-MAKING ABOUT KRT OPTIONS

We identified three main themes and 12 subthemes that play an important role in patients with CKD stage G4-G5 and could both support or impede decision-making about KRT. Figure 3 gives an overview of identified themes and subthemes. In addition to the illustrative quotations provided in the results below, Table 3 provides a selection of quotes from participants and explanations offered by the authors to illustrate each theme.

TABLE 3 Additional selection of illustrative quotes.

Themes	Perspective	Relative to interview question and discussion	Quote
Main theme 1. Patient psycho-social situation			
Subtheme: Social support and who influences decisions	Patient	Decisions about KRT were influenced by age alongside personal situations.	*For instance, if I don't want a new kidney or I don't want to dialyze. However, I do have responsibility towards my husband and if I'm younger, for my family. I believe, that is the crux, in the decision that you make. (patient, 79 years)*
Patient emotions	Patient	Assuming an active and participatory role rather than a passive role alongside the importance of making decisions independent of what others might think, was described by patients as an essential part in KRT decision-making.	*However, in the end you have to make the decision yourself. You can get all the information and then you have to read it and think about it but in the end you must make the decision yourself. (patient, 71 years)*
Subtheme: Patient-professional relationship	Professional	An open and honest relationship between doctor and patient was described as essential in supporting patient decisions.	*If people choose a conservative treatment and know that they may remain in the care of their trusted nephrologist, then they are able to make this decision with more confidence. (nurse practitioner)*
Subtheme: Patient emotions	Professional	Professionals described patients fear of failure in the NGA cognitive domain tests and patients‘ anxiety about the possible impact cognitive impairment might have on options for KRT.	*When a patient, or partner tell me that there are memory problems and I suggest we do a MMSE, then I notice patients concern "what happens if I don't perform well". (nurse practitioner)*
Subtheme: QOL and life goals	Patient	Patients consider QOL versus longevity and expressed that there are limits to what an acceptable QOL is.	*Does dialysis, in very old age, have any additional value to quality of life? (patient, 72 years)* *If I see that my situation worsens, and I'm confined to bed, then life would have no purpose for me anymore. (patient, 79 years)*
Main theme 2. Influences on modality options			
Subtheme: Medical history and frailty	Patient	Patients reported that experiences with other illnesses and accumulated experiences, all play a role in ones attitude to decisions about KRT.	*I think your medical history and all of life's losses, all counts up in your attitude towards future choices. (patient, 77 years)*
Main theme 3. Health care organization			
Subtheme: Early referral and consultation time	Professional	Early referral to kidney failure care, enough consultation time to facilitate NGA, interpret, discuss results and to enable patients to process and interpret information on KRT is important. It is conducive to building a trusting relationship with the nephrologist which lays the basis for open decision-making discussions	*You need a lot of time and the discussion about whether to dialyze or not must begin in an earlier stage. Not as dialysis is fast approaching. When patients attend the kidney failure clinic for a longer period of time, have a good relationship with their nephrologist, then the atmosphere is conducive to discussions about KRT. (social worker)*

Note: Supporting and impeding factors to decision-making in older patients with CKD stage G4-G5. Abbreviations: KRT, kidney replacement therapy; MMSE, mini mental state examination; NGA, nephrology-tailored geriatric assessment; QOL, quality of life.

THEME 1. PATIENT PSYCHO-SOCIAL SITUATION

Under the main theme *patient psycho-social situation* four subthemes were identified, that is: social support and who influences decision-making; patient-professional relationships; patient emotions; QOL and life goals.

Social support and who influences decision-making

Patients and professionals recognised that a patient's social support system can act as a double-edged sword supporting or impeding KRT-modality choices. Civil status in conjunction with a patient's level of (in)dependence or caregiver support can influence modality decisions.

> *Your children can influence your choice. I had a very passive attitude, I just didn't want to go on dialysis. But my children said 'no Mom, that [not going on dialysis] is not going to happen. You are going to go on dialysis' And I am very glad I did go on dialysis[…] I have three sons and they were in agreement with each other, they even came to the doctor with me. I am very happy and thankful. (Patient, 79 years)*

Lack of support or too much interference from family can persuade patients towards certain decisions (Table 3). Both professionals and patients reported that family were often involved in decision-making and that some patients choose (the setting) to dialyze due to family pressure:

> *I did discuss it [choice KRT] with my children. And they said:'Mom please do not start dialysis at home, you are alone, -my husband died 2 years ago- If something happens in the middle of the night! Just go to the hospital'. They felt it would be a safer option. (Patient, 86 years)*

Patient-professional's relationship

Across all groups, both patients and professionals reported the importance of having a trusting patient-professional relationship partnered by good guidance by the nephrologist, particularly for older patients, as a key supporting factor in decision-making.

> *If people choose a conservative treatment and know that they may remain in the care of their trusted nephrologist then they are able to make this decision with more confidence. (nurse practitioner)*

Patients stated that care for older patients differs from younger patients because older patients often live alone, have a shorter life expectancy which affects life goals and are more willing to trade longevity for QOL (Table 3). Patients reported feeling more vulnerable due to multiple chronic conditions, needing more time to process complex information about KRT and therefore greatly appreciate counselling and advice from trusted professionals other than support and advice from direct family and friends.

> *I think it's very important that older people are given good guidance. Whatever you choose, that you are supported by your nephrologist and nurses. (Patient, 77 years)*

Patient emotions

Patients reported feeling worried about their future on dialysis and the prospect of dialysis was even described as 'Damocles' sword'. A recurring concern of patients was their anxiety about existing in a debilitated state, being a burden to family and society and loss of independence:

> *I hope that I can delay [KRT]as long as possible, whatever happens it mustn't go to the extreme, that one exists in a vegetative state. (Patient, 85years)*

> *I don't want to be resuscitated either. As long as I can take care of myself. But I don't want to be dependent on others. (Patient, 79 years)*

> *That [being dependent on others] would certainly be the limit for me too. (Patient, 79years)*

Professionals described patient fear of failure in the NGA cognitive domain tests and patient anxiety about the possible impact cognitive impairment might have on options for KRT:

> *I notice that when we discuss cognition and a patient, or partner tell me that there are problems and I suggest we do a MMSE, then I notice patients concern 'what happens if I don't perform well?' (nurse practitioner)*

QOL and life goals

Patients reported the importance of maintaining QOL juxtaposed with their concern about a diminishing QOL following the initiation of dialysis treatment. Patients recognised that growing old can mean functional impairment and loss of independence for some people and that this impacts choices and decisions about KRT. They questioned whether dialysis in very old individuals contributes in any positive way to QOL and longevity. A number of patients expressed that there are limits to an acceptable QOL (Table 3).

[…] the younger you are the more likely you are inclined to accept treatment more so than when you are much older […] I did dialysis myself and it is an extremely burdensome treatment. So if when you are much older, you can function relatively normally and you can manage without dialysis I would consider this a better option. The question really is about whether dialysis in older age has any benefit to quality of life or lifespan (Patient 73 years).

THEME 2. INFLUENCES ON MODALITY CHOICES

Under the main theme, *influences on modality choice*, the following four subthemes were identified: medical history and frailty; patient character and attitude; health-related information and education; continual holistic assessment of situation.

Medical history and frailty

Both patients and professionals described medical history and frailty, including cognitive functioning, as significant factors influencing decision-making about KRT. Patients reported that experiences with other illnesses and experienced losses in life, all play a role in one's attitude about KRT-decisions (Table 3). Many professionals reported that NGA has the potential to uncover individual frailty (somatic, cognitive, functional and psycho-social frailty) and can enhance a well-informed choice regarding KRT:

Where is the focus of our attention with ≥ 70- year old's? As doctors we tend to concentrate on somatic aspects, patient vigour and medical history. We have too little time to explore things like cognition, quality of life, and expectations […] Perhaps we should do things differently. (nephrologist)

Patient character and attitude

Patients and professionals believed that a patient's character (i.e., optimistic or pessimistic view of life, ability to deal with life's challenges) determines an individual's attitude towards a specific modality and can support or impede decision-making:

I have a very positive attitude to life. I have loving children and very loving grandchildren whom I see regularly. Therefore I wouldn't be inclined to say: 'I'll do nothing, leave me be'. So, if I have to go on dialysis I will do it, even though I'm fairly old. (Patient, 72 years)

Health-related information and education

Both patients and professionals believed that comprehensive information which is tailored to an individual's needs on all KRT options, including conservative care, is fundamental to decision-making. This could be supported by the opportunity to undergo a time trial, peer-to-peer discussions and a visit to a dialysis centre.

I have no experience with hemodialysis, but I was offered the opportunity to visit the dialysis unit and talk to a patient on dialysis. He told me he was very, very tired with it all and he was only 50 years old! He said to me: 'if I were you I wouldn't start on it [dialysis]'. (Patient 77 years)

Furthermore, professionals observed that information about KRT in conjunction with NGA creates awareness of a patient's possibilities but also of their limitations.

We gain a better, more objective insight [NGA] which helps us to anticipate the treatment's impact. This information helps to make decisions about a less invasive therapy instead of dialysis which might offer no benefits to the patient. (nurse practitioner)

Professionals believed in the importance of continually assessing a patient's need for information and checking whether the information was processed and understood. However, contrary to professionals, some patients reported that they received too much information and experienced it as being overloaded:

I also got all the necessary information; you get one of those books. You can even keep a record in it. I thought it was a bit over the top!. (Patient, 79 years)

Professionals agreed about the importance of unbiased information delivery. However, it was suggested that a nephrologists' personal preferences often tips the balance in favour of a treatment modality:

Doctors who are motivated for peritoneal dialysis (PD) convince more patients to do PD. Yes, they tend to give a more positive picture. The patients are more inclined to think this is a suitable treatment. (nephrologist)

Continual holistic assessment of the situation

Professionals reported the need for continual assessment of a patient's situation in all geriatric domains. A broader knowledge of all domains and not merely biomedical factors is deemed necessary for insight into the patient's condition and healthcare needs.

TABLE 4 Perspectives on the added value of NGA as an aid to decision-making about KRT.

Perspective	Added value NGA	Illustrative quote
Theme 1. Facilitates continual holistic assessment		
Professional	NGA questionnaires offer the opportunity to open conversations on sensitive topics for example, mapping mood and loneliness, information which informs decision-making.	*What I really like is the frailty assessment tool because questions are posed about loneliness, mood etc. and as it is part of routine care you are able to ask without patients feeling ambushed. (nephrologist in training, 34 years)*
Theme 2. Fills the knowledge gap		
Professional	Consultation with a geriatrician after or as part of NGA helps identify frail patients and thus informs decisions about KRT.	*Yes, we have an unmet need. We realise that we are unable to identify those who would benefit or not with a kidney transplant. We sometimes reject patients who perhaps would have benefitted from kidney transplant, or accepted patients who in hindsight should have been rejected. [...] and we are searching for a method to do this better. And of course you want to consult the expert in the organization and that is [in this case] the geriatrician. (nephrologist)*
Caregiver	Information about KRT in conjunction with NGA tests creates awareness of one's possibilities but also of one's limitations.	*We saw the tests that were done, alongside the information that was given, as very positive, enabling you to make a better choice [. .]. If I had memory problems that could cause me to make mistakes, then [test-results] could support me in making a more suitable choice or make a different decision" (caregiver, 60 years)*
Patient	NGA also satisfies patients wish to know how they perform within their own unique situation and to recognised the benefits of NGA as a tool to be more involved in decision-making about KRT.	*I think it is very interesting to see whether each year it [my condition] deteriorates or stabilises as improvement is less expected at this age. (patient, 79 years)* *Due to the tests you gain more insight into your own situation and that stimulates more self-examination [...] in this way the patient is more involved in his/her own situation and importantly, the decisions about further treatment. (patient, 71 years)*
Theme 3. Uncovers unique patient characteristics		
Patient	NGA uncovers important patient concerns about loneliness, being a burden to society and the limits to treatment, issues which should be addressed during decision-making conversations about KRT.	*We grow old but the loneliness gets worse too and I think it's important to consider this as well. I mean should we continue to treat endlessly.... the financial consequences...I mean who is going to pay the bill? (patient, 72 years)*
Professional	NGA reveals more in-depth knowledge of an individual patients' character which can be a barrier to a certain modality choice.	*It depends enormously on the patient [...]. There are patients who I would consider very suitable to a home dialysis therapy. But the patient has sleepless nights just thinking about a dialysis machine at home. Yes, and these patients choose for in-center dialysis. (nephrologist)*

Abbreviations: KRT, kidney replacement therapy; NGA, nephrology-tailored geriatric assessment; QOL, quality of life.

> *[...] The work-up for kidney transplantation includes an evaluation by the cardiologist. If transplantation occurs only after three years, then re-evaluation must be performed. And of course you can understand that re-evaluation should also apply to NGA. (nephrologist)*

Early recognition of frailty has the potential to facilitate interventions which support a patient's needs (e.g., physiotherapy for balance training and muscle strengthening, case management in the home situation, home help etc.) (Table 4 provides a selection of quotes from participants about the added value of NGA).

> *When we see patients with an eGFR below 20 ml/min then we ask ourselves 'is this person frail?' The next step is to determine what can we do about it? Is support from specialist care for older patients in general practice services available? . Is extra home help available, or are tools needed to support living at home? In my experience, many people don't have a clue about the possibilities to improve their home situation. (social worker)*

THEME 3. HEALTHCARE ORGANISATION

Under the main theme *healthcare organisation*, the following four subthemes were identified: multidisciplinary approach, geriatrician consultation, early referral and consultation time.

Multidisciplinary approach

Professionals recognised the importance of multidisciplinary care with regular meetings to discuss NGA results and their impact on KRT decisions. Furthermore, including other partners, such as a district nursing/care team, an occupational therapist together with the geriatrician and nephrology team, were mentioned as a supporting factor to decision-making for KRT. Professionals stated this wider collaboration as an added value in decision-making:

> *I think it is very important to work in a multidisciplinary team. Together with the geriatrician, we can discuss which aspects of ageing play a role by a patient with kidney failure? (nurse practitioner)*

Geriatrician consultation

Most professionals considered a consultation with a geriatrician of additional value as a support to decision-making in kidney failure:

> *I think it's very important to collaborate with the geriatrician [...] to discuss which aspects of ageing are playing a role in a particular patient. To be able to understand which problems are caused by ageing and not necessarily due to kidney failure because it does get mixed up. (nurse practitioner)*

> *Being a geriatrician, you think about the consequences of dialysis, even if there are limitations, about possible interventions and actions which can be taken to ensure dialysis goes as well as possible. (geriatrician)*

Patients also reported their appreciation of a consultation with the geriatrician in particular, the time given to discuss their personal situation was valued.

> *I had a nice chat with the geriatrician which included an exchange of very personal information. Real life experiences and also information gained. (Patient 71 years)*

Discussing the options for KRT and the broader impact of such decisions with another doctor, other than the trusted nephrologist, enhanced patient involvement in decision-making and supported decisions about treatment choices:

> *[...talking with the geriatrician] you become much more involved in your own personal situation. Also more involved about the decisions that have to be made about further treatments. (Patient 72 years)*

Early referral and consultation time

Professionals expressed the importance of early referral to kidney failure care as a supporting factor to decision-making, preferably when eGFR is under 20 mL/min/1.73 m^2 with progression to kidney failure and when KRT is expected to be imminent within a year. One professional described the transition from CKD to kidney failure for patients as 'a pressure cooker moment' when postponed decisions must be finally addressed. Guidelines recommend referral to kidney failure care of at least 4 months. However, professionals stated that this time was far too short (Table 3). Patients are mostly referred when the eGFR has fallen below 20 mL/min/1.73 m^2 or even 15 mL/min/1.73 m^2, which acts as a barrier to effective decision-making when progression to kidney failure is rapid:

> *When we have little time (in kidney failure care) then we see patients frequently with shorter intervals between visits so that we can be as efficient as possible. And that is often, for this patient group, very burdensome. (consultant geriatric nurse)*

BENEFITS OF NGA IN DECISION-MAKING

The added value of NGA for decision-making was found in three major themes: (1) facilitating continual holistic assessment; (2) filling the knowledge gap, and (3) uncovering important patient characteristics. Figure 4 illustrates these three themes about the added value of NGA. Table 4 provides a selection of quotes from participants about the added value of NGA and explanations offered by the authors to illustrate each of these themes.

Overall, by performing NGA professionals believed that not only somatic frailty is unearthed but in-depth knowledge is obtained about a patient's social system and psychological wellbeing – information they consider vital for good quality decision-making about KRT.

Professionals noted that NGA performed before KRT decisions and repetition of NGA uncovers changes in geriatric domains and this can lead to a change in former KRT decisions.

> *If it is your ambition to choose wisely [...] then you need to repeat NGA in the immediate time before the final choice is made. [...] because a CVA or other major event can have an enormous impact on a patients' functionality*

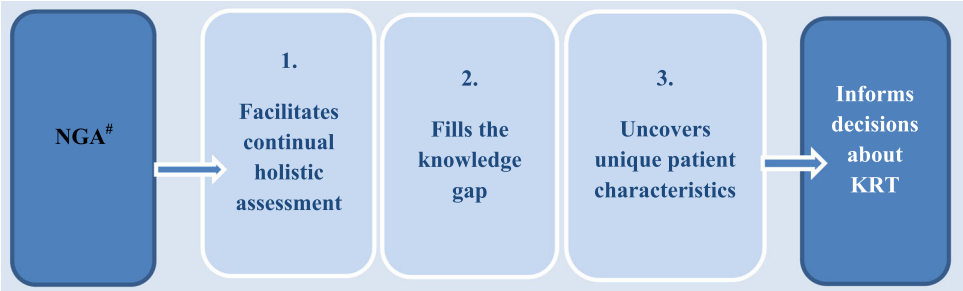

FIGURE 4 Added value of nephrology-tailored geriatric assessment in decision-making about KRT. KRT, kidney replacement therapy; #NGA, nephrology-tailored geriatric assessment.

> *but also in a patients priorities. If the reason for choosing dialysis was mainly for your partner and your partner has in the meantime passed away. (nephrologist)*

The benefits of NGA as a tool to support decision-making in KRT were recognised by some patients although less explicit. Caregivers reported that information about KRT in conjunction with NGA results creates awareness of one's possibilities but also of one's limitations which could benefit a nuanced KRT choice.

> *We saw the tests that were done, alongside the information that was given, as very positive enabling you to make a better choice [..]. If I had memory problems that could cause me to make mistakes, then [test results] could support me in making a more suitable choice or make a different decision (caregiver, 60 years)*

DISCUSSION

In this qualitative study, we uncovered perspectives about the added value of NGA in decision-making about KRT during focus groups with patients, caregivers and healthcare professionals. We elicited in-depth information about supporting and impeding factors to decision-making for KRT in older patients with kidney failure and identified three main themes: patient psycho-social situation, influencing factors on modality choice and healthcare organisation. Importantly, this is the first study which sheds light on patient, caregiver and professionals' perspectives on the added value of NGA as a tool in decision-making for KRT.

Professionals unanimously reported the benefits of NGA as a tool to identify geriatric impairments and how integration of its outcomes can inform decision-making for KRT, namely: it facilitates continual holistic assessment, it fills the knowledge gap – information that would otherwise remain unknown and it uncovers important patient characteristics. The advantages of geriatric assessment in decision-making has been reported in oncology (Festen et al., 2019; Hamaker et al., 2018; Mohile et al., 2021), in hip surgery (Zanker & Duque, 2017) and has been recommended by the American Heart Association (Rich et al., 2016). However, geriatric assessment has not yet been implemented in routine kidney failure practices. By performing NGA a more complete picture of the patient is portrayed and medical, psycho-social, cognitive and functional frailty can be identified. Early detection of impairments such as frailty offers opportunities for interventions to improve outcomes and such improvement has been reported in other studies (Eamer et al., 2018; Kleipool et al., 2020; Myers & Fonda, 2016; Roshanravan et al., 2017). Furthermore, NGA may offer the opportunity to have open discussions on sensitive topics and this dialogue facilitates a more holistic approach, is conducive to good decision-making about KRT and to the development and management of personalised and coordinated care plans.

Drawbacks of NGA practices were mentioned by professionals and related to time constraints, potential labelling of patients based on NGA results, masked illiteracy affecting interpretation of tests and dilemmas around an unsought diagnosis of dementia (Voorend et al., 2021b).

Patients had predominantly positive attitudes towards NGA, but compared to professionals, the purpose and role which NGA could play in decision-making about KRT was less clear. This discrepancy between perspectives of professionals and patients could be explained in two ways. First, in one initiative NGA had been performed following decision-making about KRT. Second, due to lack of communication about the reason for performing NGA may not have been explained in all hospitals. This underscores the importance of clear patient-professional communication throughout the CKD trajectory, consistent with findings from studies about patient dissatisfaction with information and involvement in decision-making about KRT (Ladin et al., 2017; Verberne et al., 2019). Our study also showed that patients wished to know how they perform in their unique situation. It is plausible that being able to recognise their vulnerabilities before a decision about KRT will prepare and improve patients' engagement in discussions about the possible impact of future treatments in their daily lives. In a number of studies, patient involvement in decision-making was shown to be associated with improved satisfaction, QOL and treatment adherence (Bunn et al., 2018; Chewning et al., 2012; Mechta Nielsen et al., 2018;

Shay & Lafata, 2015; Wolff & Boyd, 2015). Moreover, confirming other studies, we found that knowledge about cognitive or functional decline could potentially facilitate managing and tempering of unrealistic patient expectations about life on dialysis and in turn may limit regret about KRT decisions (Berkhout-Byrne et al., 2017a; Gilman et al., 2017; Tan et al., 2019).

Consistent with other studies, we found an overlap between patients' and professionals' perspectives about supporting and impeding factors for decision-making about KRT (Morton et al., 2012; Raj et al., 2019). These included: a trusting relationship with the nephrologist, maintenance of QOL, comprehensive information and education, timely referral to kidney failure care and medical history, frailty and age. In addition, some perspectives were reported as bidirectional, for example, where the role of the family can endorse or embargo a patient's preferred treatment. Previous research corroborates our findings about the role of informal caregivers in decision-making (Clayman et al., 2005; de Rosenroll et al., 2013; Laidsaar-Powell et al., 2013; Raj et al., 2019; Riffin et al., 2018; Wolff & Roter, 2008). Recognition of bidirectional aspects of specific perspectives may enhance awareness of the complexity of decision-making about KRT in older patients approaching kidney failure and underline the importance of tailoring discussions to suit each patient. Professionals considered early referral conducive to building a trusting relationship with the nephrologist and multidisciplinary team which lays the basis for open decision-making discussions (Segall et al., 2017). Early referral offers more opportunities for interactions with professionals to help patients understand, process and discuss complex information and to weigh benefits and burdens of all options against patient's life goals, values and preferences which has been reported as an important and modifiable factor to aid decisions (Bunn et al., 2018; Pieterse et al., 2019).

The strength of our study was the novel insight into patients' and professionals' perspectives on the role of NGA in decision-making about KRT which is to our knowledge the first of its kind. Patients and professionals were purposively sampled from experienced multidisciplinary kidney failure nephrology teams, from multiple hospitals across The Netherlands using three different NGA practices at major university institutions (Voorend et al., 2021b). This diversity yielded a kaleidoscope of perspectives from participants about NGA and its added value to decision-making about KRT and improved transferability of our findings.

LIMITATIONS

Our findings should be interpreted in light of recognised limitations. First, in the patient focus groups, recall bias might have been an issue for some patients as time had passed since they underwent the assessment. This could mean that participants gave 'appropriate' answers rather than their perspective or remained silent in other discussions. For professionals, we expected this to be less of an issue as NGA was an ongoing procedure in their nephrology practice. Second, the selection of patients who gave informed consent may have been relatively healthy since non-motivated patients and those with physical and mental disabilities may have refused to participate or may not have been approached. Therefore, results might have been biased towards a more positive attitude on their healthcare and NGA, potentially affecting transferability. For this reason, we included patients with a broad range of perspectives using purposive sampling methods from three different practices. Third, although we strived to achieve a broad and varied research group, we cannot rule out that interpretation of the data may possibly be influenced by our experience, ideas and preconceptions.

IMPLICATIONS FOR CLINICAL PRACTICE

Our study addresses the relevance of geriatric assessment in nephrology care. Clinicians should perform NGA and discuss results before decision-making for a better-informed decision process. Recently our groups have published a suggested test-set appropriate for use in outpatient nephrology (Voorend et al., 2021b). Further research is required to gain insights into the feasibility and acceptability of implementation in routine care. Also, the prognostic capacity of NGA instruments and determinants of adverse outcomes requires further research (van Oevelen et al., 2021a). Our study did not set out to discuss the shared decision-making (SDM) model as proposed by Elwyn et al. (2017) and later adapted by Elwyn and Vermunt (2020). However, we recognise that there is potential to incorporate the outcomes of NGA in the SDM model.

CONCLUSION

Both patients and professionals had positive attitudes towards NGA, describing it as a useful tool to identify geriatric impairments in older patients with kidney failure. Integration of NGA outcomes facilitates a more holistic approach to inform choices and decisions about KRT based on patient characteristics, values, expectations and goals.

AUTHOR CONTRIBUTIONS

Research idea and study design: Noeleen C. Berkhout-Byrne, Carlijn G. N. Voorend, Marjolijn Van Buren, Willem Jan W. Bos and Simon P. Mooijaart. *Data acquisition*: Noeleen C. Berkhout-Byrne and Carlijn G. N. Voorend. *Data analysis/interpretation*: Noeleen C. Berkhout-Byrne, Carlijn G. N. Voorend, Marjolijn Van Buren, Yvette Meuleman, Simon P. Mooijaart and Willem Jan W. Bos. *Supervision or mentorship*: Marjolijn Van Buren and Willem Jan W. Bos. Each author contributed important intellectual content during manuscript draughting or revision and accepts accountability for the overall work by ensuring that questions pertaining to the accuracy or integrity of any portion of the work are appropriately investigated and resolved.

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CONFLICTS OF INTEREST STATEMENT

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DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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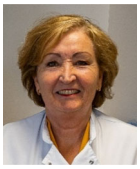

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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