Application of the 2017 KDIGO Guideline for the Evaluation and Care of Living Kidney Donors to Clinical Practice

Amit X. Garg,1 Andrew S. Levey,2 Bertram L. Kasiske,3 Michael Cheung,4 and Krista L. Lentine,5 on behalf of the KDIGO Clinical Practice Guideline on the Evaluation and Care of Living Kidney Donors Work Group and Evidence Review Team*

Abstract
The Kidney Disease: Improving Global Outcomes (KDIGO) 2017 “Clinical Practice Guideline on the Evaluation and Care of Living Kidney Donors” was developed to assist medical professionals who evaluate living kidney donor candidates and provide care before, during, and after donation. This guideline Work Group concluded that a comprehensive approach to donor candidate risk assessment should replace eligibility decisions on the basis of assessments of single risk factors in isolation. To address all issues important to living donors in a pragmatic and comprehensive guideline, many of the guideline recommendations were on the basis of expert consensus opinion even when no direct evidence was available. To advance available evidence, original data analyses were also undertaken to produce a “proof-of-concept” risk projection model for kidney failure. This was done to illustrate how the community can advance a new quantitative framework of risk that considers each candidate’s profile of demographic and health characteristics. A public review by stakeholders and subject matter experts as well as industry and professional organizations informed the final formulation of the guideline. This review highlights the guideline framework, key concepts, and recommendations, and uses five patient scenarios and 12 guideline statements to illustrate how the guideline can be applied to support living donor evaluation and care in clinical practice.

Introduction
For patients with kidney failure (approximately 5 million worldwide), transplantation offers a longer, better quality life at a fraction of the cost of dialysis (1,2). Unfortunately, the number of patients in need of a transplant continues to rise, and there are too few deceased donors to meet the demand. The alternative, a living donor transplant, offers many advantages, including superior graft and patient survival, shorter wait times, and lower health care costs (3,4). We estimate that over half a million people worldwide have donated a kidney, with 260,000 candidates now undergoing an evaluation each year (resulting in 30,000 persons donating a kidney each year) (5,6). Concern for the health and welfare of the living donor is paramount, and a lack of evidence and inconsistent guidance from expert groups underscore a critical need to strengthen the rigor, safety, and defensibility of donor selection and follow-up (7). In response, Kidney Disease: Improving Global Outcomes (KDIGO), a global nonprofit organization dedicated to developing and implementing evidence-based clinical practice guidelines in kidney disease, convened both an international Work Group and Evidence Review Team (8). The organization’s first “Clinical Practice Guideline on the Evaluation and Care of Living Kidney Donors,” published in 2017, helps inform donor candidate evaluation and care before, during, and after donation, with information organized across 19 chapters (8).

The guideline emphasizes shared decision making among donor candidates and providers. In this synopsis, we review the framework and key concepts advanced through the guideline related to assessing donor risk. We also provide a checklist of items for the evaluation, care, and follow-up of living kidney donors (Table 1). Finally, we use five patient scenarios to illustrate the use of consensus-based guideline recommendations in clinical care, which includes topics that warrant future research.

A Framework to Quantify Postdonation Risk and Its Application to Decision Making
The practice of living kidney donation occurs in a complex medical, ethical, and social context, which the Work Group considered in developing its recommendations. A key consideration is that donation may increase the risk to donors for some adverse outcomes compared with if they had not donated a kidney. A poor outcome can negatively affect the donor, the recipient, and public opinions about donation. Details on different perspectives of risk are described elsewhere (9,10), and the approach used by KDIGO to compile relevant evidence is presented in the Supplemental Appendix.
A central goal of the 2017 KDIGO guideline is to advance a framework to evaluate and select donor candidates on the basis of the predicted long-term risk for adverse outcomes from simultaneous consideration of predonation demographic and health characteristics. An example of a tool that enables such projected risk estimation is presented in Table 2. This tool focuses on the postdonation outcome of permanent kidney failure treated with dialysis or transplantation.
Decision making is then guided by comparing the donor term risk that may at least in part result from donation. transplant program because it is a central outcome of a donor candidate

established by a program for donor candidate selection. whether to proceed with living kidney donation after

failure (which in the analysis was 3.5

predicted incidence of kidney failure in the absence of donation are then multiplied by the donation-attributable relative risk of kidney

projection tool is available online at http://www.transplantmodels.com/esrdrisk/. For clinical application, estimates provided for the
demographic and health characteristics. The multistep modeling process was complex and independently published (34), and the risk

Outcomes Clinical Practice Guideline on the Evaluation and Care of Living Kidney Donors Work Group collaborated with the CKD

general population. To leverage the information available in general population cohorts, the Kidney Disease: Improving Global

Prognosis Consortium to model the long-term risk of kidney failure in the absence of donation on the basis of ten candidate predonation
demographic and health characteristics. The multistep modeling process was complex and independently published (34), and the risk

projection tool is available online at http://www.transplantmodels.com/esrdrisk/. For clinical application, estimates provided for the
predicted incidence of kidney failure in the absence of donation are then multiplied by the donation-attributable relative risk of kidney
failure (which in the analysis was 3.5–5.3 according to sex and race).

be because it is a central outcome of a donor candidate’s long-
term risk that may at least in part result from donation. Decision making is then guided by comparing the donor candidate’s projected risk of an adverse outcome with the transplant program’s acceptable risk threshold, where the latter is defined as the upper limit of acceptable risk established by a program for donor candidate selection. Under such a framework, when a candidate’s estimated risk is above the acceptable threshold, the transplant program is justified in declining the candidate and can ground its decision in a quantitative framework. When a donor candidate’s estimated risk is below the acceptable risk threshold, the transplant program should accept a donor candidate, and it should be the candidate’s decision whether to proceed with living kidney donation after understanding the risks (Figure 1).

1.10. All donor candidates should be evaluated using the same criteria, regardless of whether donation is directed toward a designated recipient.

1.11. Each transplant program should establish policies describing medical criteria that are acceptable for donation, addressing when possible, numeric thresholds for short-term and long-term postdonation risks above which the transplant program will not proceed with donation. Risks should be expressed as absolute rather than relative risks.

This approach differs from prior living kidney donor guidelines that describe postdonation risk in relation to single predonation characteristics assessed in isolation. Prior guidelines also differ on the recommended specific thresholds for a characteristic that should be used to accept or decline living kidney donor candidates (7). For example, historically, most programs excluded donors with a body mass index exceeding a predetermined threshold, usually between 30 and 35 kg/m², without considering additional donor characteristics or risk factors. By comparison, the KDIGO guideline endorses individualizing the decision to approve donation in obese candidates on the basis of their predicted long-term risk in relation to the transplant program’s acceptance threshold.

The example risk tool in Table 2 is a proof of concept, and the Work Group strongly endorses continued efforts to improve the precision and generalizability of predonation risk estimation, including consideration of additional factors such as genetic and familial traits, and to incorporate tailored prediction of the risk effect of donation (11). Since publication of the guideline, investigators have continued to make important contributions to this estimation (11,12).

The guideline also provides recommendations on the framework for decision making as well as the roles and responsibilities of various stakeholders. If a donor candidate is not accepted, the transplant program should explain the reason for nonacceptance to the donor candidate. The program should formulate a plan for any needed care and support for a declined donor candidate. Such support may include alternative ways of helping the intended recipient and the possibility of referral to another program for a second opinion if the donor candidate does not accept the noneligibility decision. Finally, transplant programs should conduct as efficient a donor evaluation as possible, meeting

### Table 2. Example of a projection tool to estimate kidney failure risk in donor candidates (32) and a method for communicating such risks (9,33)

<table>
<thead>
<tr>
<th>Suggested Steps and Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) An online tool (<a href="http://www.transplantmodels.com/esrdrisk/">http://www.transplantmodels.com/esrdrisk/</a>) estimates the projected lifetime risk of permanent kidney failure treated by dialysis or transplantation in the absence of donation according to baseline demographic and clinical characteristics included in the online tool</td>
</tr>
<tr>
<td>(2) This projected predonation risk can be multiplied by the best available estimate for donation-attributable risk to obtain the projected postdonation risk; for example, Grams et al. (34) report a relative risk of 3.5–5.3 for 15-yr kidney failure risk according to sex and race</td>
</tr>
<tr>
<td>(3) The projected risk estimate can be compared with the program’s postdonation threshold of acceptable risk</td>
</tr>
<tr>
<td>(4) Use the tool cautiously when there is concern that the individual has risk factors not captured in the tool (e.g., familial or genetic risk) and for younger candidates</td>
</tr>
<tr>
<td>(5) When communicating kidney failure risk to donor candidates:</td>
</tr>
<tr>
<td>Use plain language to make written and verbal materials more understandable</td>
</tr>
<tr>
<td>Present data using absolute risks</td>
</tr>
<tr>
<td>Present information in pictographs if graphs are included</td>
</tr>
<tr>
<td>Present data using frequencies</td>
</tr>
<tr>
<td>Use an incremental risk format to highlight how postdonation risks change from preexisting baseline levels</td>
</tr>
<tr>
<td>Be aware that the order in which risks and benefits are presented can affect risk perceptions</td>
</tr>
<tr>
<td>Consider using summary tables that include all risks and benefits associated with donation</td>
</tr>
<tr>
<td>Consider presenting only the information that is most critical to the patients’ decision making, even at the expense of completeness</td>
</tr>
<tr>
<td>Repeatedly draw patients’ attention to the time interval over which a risk occurs</td>
</tr>
</tbody>
</table>

A model was developed to project the estimated 15-year and lifetime risk of kidney failure in the absence of donation (“baseline risk”) on the basis of simultaneous consideration of each candidate’s profile of demographic and health characteristics. In brief, cohort studies on kidney failure risk are only available for approximately 150,000 living donors, but they are available for millions of healthy persons in the general population. To leverage the information available in general population cohorts, the Kidney Disease: Improving Global Outcomes Clinical Practice Guideline on the Evaluation and Care of Living Kidney Donors Work Group collaborated with the CKD Prognosis Consortium to model the long-term risk of kidney failure in the absence of donation on the basis of ten candidate predonation demographic and health characteristics. The multistep modeling process was complex and independently published (34), and the risk

projection tool is available online at http://www.transplantmodels.com/esrdrisk/. For clinical application, estimates provided for the
predicted long-term risk in relation to the transplant program’s acceptance threshold.

The example risk tool in Table 2 is a proof of concept, and the Work Group strongly endorses continued efforts to improve the precision and generalizability of predonation risk estimation, including consideration of additional factors such as genetic and familial traits, and to incorporate tailored prediction of the risk effect of donation (11) Since publication of the guideline, investigators have continued to make important contributions to this estimation (11,12).
C would be unacceptable because the estimated postdonation projected postdonation risk is close to the threshold, and candidate B could be accepted with caution because the estimated projected postdonation risk is far below the threshold. For example, candidate A would be acceptable because the same threshold should apply to all donor candidates at each program. The threshold may vary across transplant programs, but the same threshold should apply to all donor candidates at each program. For example, candidate A would be acceptable because the estimated projected postdonation risk is far below the threshold. Candidate B could be accepted with caution because the estimated projected postdonation risk is close to the threshold, and candidate C would be unacceptable because the estimated postdonation projected risk is far above the threshold.

the needs of donor candidates, intended recipients, and transplant programs.

Applying Guideline Recommendations in Clinical Care: Patient Scenario Examples

We use five patient scenario examples to demonstrate how care can be informed by the guideline recommendations (Figure 2). These examples illustrate common scenarios, including consideration of multiple donor candidates for a given recipient and how a candidate’s age, race, and genetic factors inform risk (scenario 1); evaluation of a donor candidate with a family history of autosomal dominant polycystic kidney disease (ADPKD; scenario 2); evaluation of a donor candidate with microscopic hematuria (scenario 3); and support for long-term donor health and well-being (scenario 4), including a donor candidate with an interest in future pregnancy (scenario 5). In many cases, it is difficult (and sometimes impossible) to formulate an issue into an answerable focused question that, in turn, can be supported by a rigorous evidence base. In such cases, information in the guideline provides context on how an experienced group of peers thinks about a clinical situation.

Patient Scenario 1. Black Donor Candidates, Predonation Kidney Function Evaluation, and APOL1 Genotyping

Guideline Chapter 5 discusses the assessment of predonation kidney function (as GFR) and the use of GFR in risk estimation in combination with age, sex, and race (Figure 3). After adjustment for age and level of GFR, black persons have a higher projected risk of kidney failure than whites, and men have a higher projected risk than women. For each sex and race combination, older age is generally associated with a higher 15-year projected risk of kidney failure but always associated with lower projected lifetime risk, and for each age, a higher predonation GFR is associated with lower projected risk (Supplemental Figure 1). Provided in this chapter is the rationale for why donor kidney function should be expressed as GFR and not as serum creatinine concentration, why GFR should be expressed in milliliters per minute per 1.73 m² rather than milliliters per minute, how to assess GFR, and the rationale for the use of predonation GFR in combination with other characteristics for risk prediction rather than a comparison with a single GFR threshold value for donor acceptability.

5.6. GFR of 90 ml/min per 1.73 m² or greater should be considered an acceptable level of kidney function for donation.

5.7. The decision to approve donor candidates with GFR 60–89 ml/min per 1.73 m² should be individualized on the basis of demographic and health profile in relation to the transplant program’s acceptable risk threshold.

5.8. Donor candidates with GFR<60 ml/min per 1.73 m² should not donate.

For example, a transplant program may decide to approve donation when the projected lifetime risk of kidney failure after donation is ≤5%. In the case of scenario 1, the example risk tool featured in the guideline would suggest that the intended recipient’s husband as a donor candidate would have a 0.35% 15-year projected risk of kidney failure in the absence of donation and a 2.92% lifetime risk. Corresponding numbers for the recipient’s mother are 0.28% and 0.33%, respectively. Assuming that donation increases the relative risk of kidney failure by fourfold, the postdonation projected lifetime risk of kidney failure might be 11.7% for the husband and 1.3% for the mother, with some uncertainty in long-term outcomes on the basis of existing literature. This would suggest that the mother but not the husband would be an acceptable donor at this time. This approach also has the potential benefit of the husband becoming a donor in the future if the transplant from the mother fails.

Chapter 14 includes recommendations related to APO L1 (APOL1) genotyping, where APOL1 genotyping may be offered to donor candidates with sub-Saharan African ancestors. Donor candidates can be informed that having two APOL1 allele risk variants increases the lifetime risk of kidney failure but that the precise kidney failure risk for an affected individual after donation cannot currently be quantified. The guideline also emphasizes the need for ongoing research to define the role of APOL1 genotyping in the living donor candidate evaluation, a topic being addressed in new initiatives like the National
Figure 2. | Five patient scenarios illustrate application of the KDIGO evaluation framework and guideline recommendations. These case scenarios illustrate use of a sample of recommendations from 19 guideline chapters. ADPKD, autosomal dominant polycystic kidney disease; BMI, body mass index.
Patient Scenario 2. Donor Candidates Genetically Related to an Intended Recipient with ADPKD

Guideline Chapter 14 outlines considerations related to genetic kidney disease, including ADPKD. The guideline recommends that, when an intended recipient is genetically related to the donor candidate, efforts should be made to determine the cause of the intended recipient’s kidney failure, whether the cause is genetic, and whether the disease can cause kidney failure.
be tested for this same mutation. However, when mutation

Linkage-based genetic diagnoses of ADPKD using poly-

omorphisms also sometimes help diagnose or exclude the condition (16). DNA testing can
tomography or magnetic resonance imaging may be

absent or limited number of cysts seen on kidney computed

cyst reliably rules out the presence of ADPKD in candidates

sound with both kidneys together showing no cysts or one
type (PKD1 or PKD2). Although the
diagnosis and ADPKD exclusion have been established for

ADPKD (14,15). Age-dependent imaging criteria for di-
agnosis and ADPKD exclusion have been established for

diseases Conference, which summarized diagnostic criteria for

rationale refers to recent studies and a KDIGO Controver-
sies Conference, which summarized diagnostic criteria for

ADPKD (14,15). Age-dependent imaging criteria for di-
agnosis and ADPKD exclusion have been established for

adults with a family history of ADPKD of unknown gene

carrier, and thin basement membrane nephropathy. All three conditions are associated with increased

risks of developing hypertension and proteinuria com-
pared with the general population over time, but unlike

IgA nephropathy and Alport syndrome, thin basement

membrane nephropathy rarely progresses to kidney fail-
uire (19). The guideline summarizes postdonation data

showing no harm for donors with thin basement mem-

brane nephropathy, recognizing that the information is

limited to small series with short-term follow-up (20,21).
The guideline offers an ungraded recommendation that
donor candidates with IgA nephropathy should not
donate, and in the text, also discourages women who

are carriers of X-linked Alport syndrome (i.e., COL4A5

mutation) from donation.

7.3. Donor candidates with hematuria from a reversible
cause that resolves (e.g., a treated infection) may be ac-
cceptable for donation.

Referenced in the guideline are epidemiologic studies of
asymptomatic kidney diseases that can present with
microscopic hematuria, including IgA nephropathy, Al-
port syndrome, and thin basement membrane nephropa-
thy. All three conditions are associated with increased
risks of developing hypertension and proteinuria com-
pared with the general population over time, but unlike

IgA nephropathy and Alport syndrome, thin basement

membrane nephropathy rarely progresses to kidney fail-
uire (19). The guideline summarizes postdonation data

showing no harm for donors with thin basement mem-

brane nephropathy, recognizing that the information is

limited to small series with short-term follow-up (20,21).
The guideline offers an ungraded recommendation that
donor candidates with IgA nephropathy should not
donate, and in the text, also discourages women who

are carriers of X-linked Alport syndrome (i.e., COL4A5

mutation) from donation.

Patient Scenario 3. Microscopic Hematuria and Newly
Detected Kidney Disease

Guideline Chapter 7 describes how donor candidates can
be assessed for microscopic hematuria and recommends
how those with persistent microscopic hematuria undergo
testing for possible causes. Appropriate testing may in-
clude urinalysis and urine culture to assess for infection,
cystoscopy and imaging to assess for urinary tract malign-
nancy, 24-hour urine stone panel to assess for nephroli-
thisis and/or microlithiasis, and a kidney biopsy to assess
glomerular disease. An algorithm that serves as one
example on how to undertake such testing is presented
in Figure 4.

7.3. Donor candidates with hematuria from a reversible
cause that resolves (e.g., a treated infection) may be ac-
cceptable for donation.

Referenced in the guideline are epidemiologic studies of
asymptomatic kidney diseases that can present with
microscopic hematuria, including IgA nephropathy, Al-
port syndrome, and thin basement membrane nephropa-
thy. All three conditions are associated with increased
risks of developing hypertension and proteinuria com-
pared with the general population over time, but unlike

IgA nephropathy and Alport syndrome, thin basement

membrane nephropathy rarely progresses to kidney fail-
uire (19). The guideline summarizes postdonation data

showing no harm for donors with thin basement mem-

brane nephropathy, recognizing that the information is

limited to small series with short-term follow-up (20,21).
The guideline offers an ungraded recommendation that
donor candidates with IgA nephropathy should not
donate, and in the text, also discourages women who

are carriers of X-linked Alport syndrome (i.e., COL4A5

mutation) from donation.

Patient Scenario 4. Obtaining Informed Consent,
Psychosocial Evaluation, Assessing Lifestyle Risk Factors,
and Developing a Plan for Health Care Maintenance
and Follow-Up

Obtaining informed consent and evaluating the relation-
ship between the donor candidate and the recipient are
critical aspects of the donor evaluation. Guideline Chapter
2 describes the process of informed consent in living
donation, which includes ascertaining voluntarism and
disclosing that it may be a crime to receive valuable
consideration (money or property) for donation. Guideline
Chapter 16 discusses the importance of understanding the
donor-recipient relationship in the psychosocial assessment
of donor candidates.

16.2. To ensure voluntariness, at least a portion of the
psychosocial evaluation of the donor candidate should be
performed in the absence of the intended recipient, family
members, and other persons who could influence the do-
nation decision.

Figure 4. | Following a stepwise approach in the evaluation of mi-
croscopic hematuria in living kidney donor candidates facilitates
efficiency. AER, albumin excretion rate; hpf, high-power field; RBC, red blood cell. Reprinted from ref. 8, with permission.

14.5. In cases where it remains uncertain whether the donor
candidate has a genetic kidney disease and whether the
disease can cause kidney failure, donation should proceed
only after informing the donor candidate of the risks of
donation if the disease manifests later in life.

The guideline recommends that donor candidates with
ADPKD should not donate but that donor candidates with
a family history of ADPKD in a first-degree relative may be
acceptable for donation if they meet age-specific imaging or
genetic testing criteria that reliably exclude ADPKD. The
rationale refers to recent studies and a KDIGO Controver-
sies Conference, which summarized diagnostic criteria for
ADPKD (14,15). Age-dependent imaging criteria for di-
agnosis and ADPKD exclusion have been established for
adults with a family history of ADPKD of unknown gene
type (PKD1 or PKD2). Although the finding of an ultra-
sound with both kidneys together showing no cysts or one
cyst reliably rules out the presence of ADPKD in candidates
40 years old or older, the utility of ultrasound in younger
donor candidates is more limited. In such patients, an
absent or limited number of cysts seen on kidney computed
tomography or magnetic resonance imaging may be
considered to rule out ADPKD (15). DNA testing can
also sometimes help diagnose or exclude the condition (16).
Linkage-based genetic diagnoses of ADPKD using poly-
morphic markers flanking of two disease genes is now
rarely performed. Rather, direct mutation screening (by
Sanger or next generation sequencing) is now commonly
used for molecular diagnosis of ADPKD (17,18). Up to 15%
of patients with suspected ADPKD have a negative
comprehensive mutation screen. If the first-degree relative
with ADPKD undergoes PKD1 and PKD2 mutation screen-
ing (using an acceptable technique), and if a pathogenic
mutation is successfully identified, the donor candidate
can be tested for this same mutation. However, when mutation

screening in the first-degree relative with ADPKD is
negative, DNA testing, including molecular diagnostics,
is unhelpful in determining whether the donor candidate
does or does not have ADPKD.
In addition to determining whether a candidate is eligible to become a kidney donor, the donor evaluation team has an opportunity to develop a strategy to minimize each donor’s risk of postdonation complications. Specific to the importance of tobacco abstinence, Guideline Chapter 4 on perioperative evaluation and management recommends that donor candidates who smoke be advised to quit at least 4 weeks before donation to reduce their risk of perioperative complications. Guideline Chapter 11 on lifestyle risk factors suggests that donor candidates who use tobacco products be counseled on the risks of cancer, cardiopulmonary disease, and kidney failure, that they should be advised to abstain from use of tobacco products, and that they should be referred to a tobacco cessation support program if possible. Although tobacco use is not an absolute contraindication to donation, the guideline recommends that the decision to approve a donor candidate who is an active tobacco user should be individualized on the basis of their demographic and health profile in relation to the transplant program’s acceptable risk threshold (scenario 1).

Guideline Chapter 19 of the guideline recommends that each donor be provided a personalized postdonation follow-up care plan before donation, which clearly describes what follow-up is needed, who will provide the care, and how often. In the case of a non-local donor or donor with limited financial resources, the donor evaluation team has a responsibility to assess whether there is a reliable way for the donor to receive this care after donation.

19.2. The following measurements and procedures should be performed at least annually postdonation:
- BP; body mass index; serum creatinine measurement with GFR estimation; albuminuria; review and promotion of a healthy lifestyle, including regular exercise, healthy diet, and abstinence from tobacco; and review and support of psychosocial health and wellbeing.
19.3. Donors should be monitored for CKD, and those meeting criteria for CKD should be managed according to the 2012 KDIGO CKD Guideline.
19.4. Donors should receive age-appropriate health care maintenance and management of clinical conditions and health risk factors according to clinical practice guidelines for the regional population.

As described in Guideline Chapter 16, the donor team can plan to provide psychosocial support at a distance, which includes support in the uncommon case where the recipient has a poor outcome in the early years after transplantation (in approximately 3%-5% of living kidney donor transplants, the recipient or their graft does not survive the first year). The team can also counsel and prepare the donor candidate for the possible financial effect of donation. Chapter 18 on the ethical, legal, and policy considerations in living donation recommends that donor candidates should be informed of the availability of legitimate financial assistance for expenses from evaluation and donation. Initiatives to remove financial disincentives for kidney donation (i.e., replacement of costs incurred by the donation, such as loss of income, travel, and accommodations for the evaluation and donation) are acceptable as an issue of justice (22). Governmental and other programs to reimburse living organ donors for the nonmedical expenses that they incur have been implemented in many jurisdictions (23,25).

**Patient Scenario 5. Pregnancy Risks**

Guideline Chapter 15 of the guideline considers pregnancy in the context of living donation. The guideline recommends that women candidates should be asked about future childbearing plans, that they should not be excluded from donation solely because they desire to become pregnant after donation, and that women with childbearing potential be counseled about the effects that donation may have on future pregnancies (25,26), including the possibility of a greater likelihood of being diagnosed with gestational hypertension or preeclampsia. The guideline also recommends that women with childbearing potential who proceed with donation should be counseled on how to reduce the risk of complications in future pregnancies (e.g., maintain a healthy pre-pregnancy weight).

15.5. Women should not be excluded from donation solely because they desire to conceive children after donation. 15.6. Women with a prior hypertensive disorder of pregnancy may be acceptable for donation if their long-term postdonation risks are acceptable.

To strengthen informed choice in living kidney donation and the safety, protection, and care of all donor candidates, robust commitment and collaboration across researchers, clinicians, and policy makers are needed to measure and present risks and benefits and to support donor candidates in informed decision making. The more that we understand risk and disclose it transparently, the more we can help support public trust and advance living kidney donation within a defensible system of practice. The 2017 KDIGO guideline marks an important step in advancing a new framework for consistent, transparent decision making in the evaluation and selection of living donor candidates which can and should be updated with evolving evidence. Ongoing empirical studies, including formal evaluations of education, removal of disincentives, practice efficiency, and risk evaluation and communication, are necessary to advance the evidence base grounding the practice (9,27–29).

**Acknowledgments**

The authors thank the Kidney Disease: Improving Global Outcomes (KDIGO) Co-Chairs, David C. Wheeler and Wolfgang C. Winkelmayr, for their invaluable guidance. The KDIGO Clinical Practice Guideline on the Evaluation and Care of Living Kidney Donors Work Group also acknowledges all who provided feedback during the stakeholder review of the draft guideline.

The editors wish to acknowledge that this review includes information from “KDIGO clinical practice guideline on the evaluation and care of living kidney donors” (8), and there is some overlap between this article and the original guidelines.

This guideline is supported by KDIGO, and no funding is accepted for the development of specific guidelines.
Disclosures
The research institution of Dr. Garg has received partnership funding from Astellas Canada for Canadian Institutes of Health Research–funded grants in living kidney donation. Dr. Levey, Dr. Kasiske, Dr. Cheung and Dr. Lentine have nothing to disclose.

Funding
Dr. Garg is supported by the Dr. Adam Linton Chair in Kidney Health Analytics and a Clinician Investigator Award from the Canadian Institutes of Health Research. Dr. Lentine is supported by the Mid-America Transplant/Jane A. Beckman Endowed Chair in Transplantation and receives funding related to living donation research from National Institutes of Health grant U01DK116042 and National Institute of Diabetes and Digestive and Kidney Diseases grant R01DK120551.

Supplemental Material
This article contains the following supplemental material online at http://cjasn.asnjournals.org/lookup/suppl/doi:10.2215/CJN.12141019/-/DCSupplemental.

Supplemental Appendix. Guideline development principles and methods.

Supplemental Figure 1. The effect of age, sex, race, and predonation GFR on 15-year and predicted lifetime risk of kidney failure.

References


*Guideline Work Group Members: Amit X. Garg (Chair), Krista L. Lentine (Chair), Patricia L. Adams, Josefina Alberú, Mohamed A. Bakr, Lorenzo Gallon, Catherine A. Garvey, Sandeep Guleria, Bertram L. Kasiske, Andrew S. Levey, Philip Kam-Tao Li, Dorry L. Segev, Sandra J. Taler, Kazunari Tanabe, Linda Wright and Martin G. Zeier. Evidence Review Team Members: Timothy J. Wilt, Areef Ishani, Yelena Slinin, Michelle Brasure and Maureen Carlyle.

Published online ahead of print. Publication date available at www.cjasn.org.